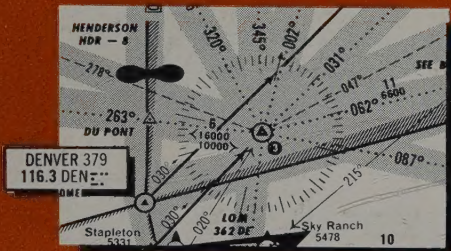


SEPTEMBER 1957

Skyways

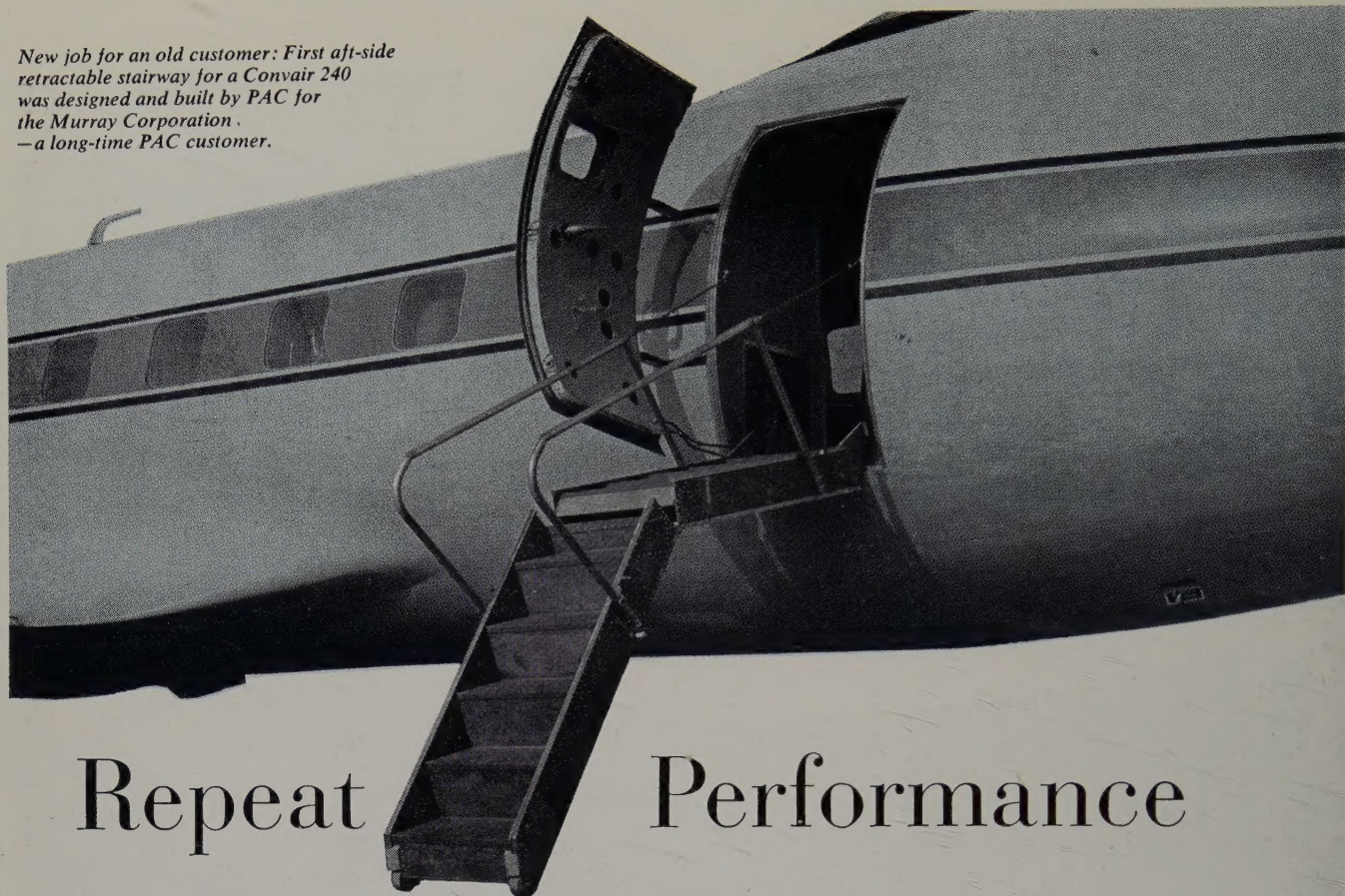
FOR BUSINESS



PRE-CONVENTION ISSUE

10TH ANNUAL NBAA FORUM Denver Col. Oct. 2-3-4

New job for an old customer: First aft-side retractable stairway for a Convair 240 was designed and built by PAC for the Murray Corporation — a long-time PAC customer.



Repeat Performance

Pacific Airmotive considers its highest recommendation to be the large number of owners and operators who return time after time, year after year, to PAC for aircraft modification, overhaul, and repair.

Operators of executive craft, private planes and commercial airliners are among PAC's valued roster of repeat customers who regularly avail themselves of PAC's complete facilities and highly-skilled personnel.

The retractable stairway for the Murray Corporation's Convair 240 is a case in point. With confidence in PAC gained from prior overhaul, maintenance and repair operations, the Murray Corporation entrusted PAC engineers with a major problem:

to design, develop and install in nine weeks the rear-door-mounted flexible stairway illustrated above. Weighing less than 200 pounds, it can be raised and lowered from both interior and exterior control stations. At the same time, PAC performed a hundred-hour check and re-license on the plane; and, in cooperation with Qualitron, Inc., and Aero Interiors, installed an auto pilot and made extensive interior modifications to this latest addition to the Murray Corporation fleet.

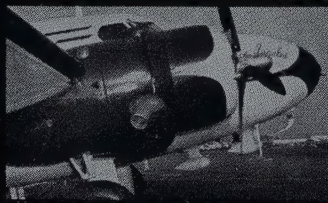
In addition to complete overhaul, testing, and maintenance facilities, Pacific Airmotive is equipped for all types of airframe engineering and modification: radio, radar, and hydraulic installation and maintenance, and complete "one-stop" service in all aircraft categories. Production-line techniques and full inventories of factory parts speed delivery and reduce costs.



PACIFIC AIRMOTIVE CORPORATION

2940 N. HOLLYWOOD WAY, BURBANK, CALIFORNIA

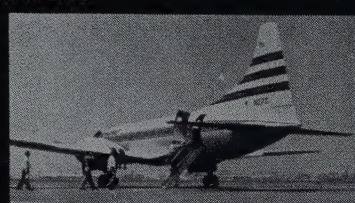
Aircraft flown by typical long-time PAC customers are illustrated below.



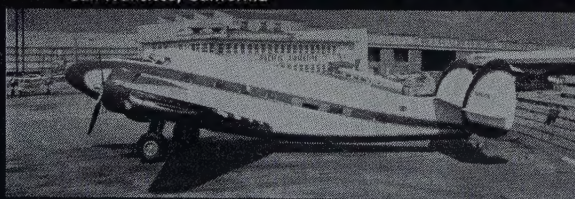
Columbia-Geneva Steel Corporation,
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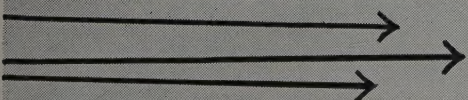
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THE**

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That's why more Apaches
by far have been built
and sold than any other
executive twin in the world...

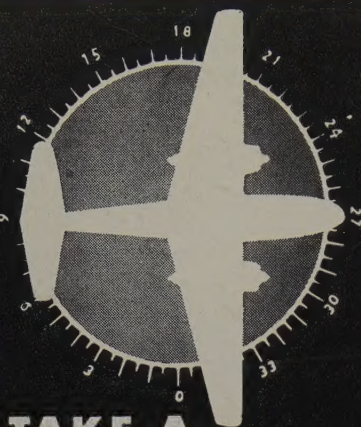



MORE PEOPLE HAVE BOUGHT PIPERS
THAN ANY OTHER PLANE IN THE WORLD

PIPER

AIRCRAFT CORPORATION

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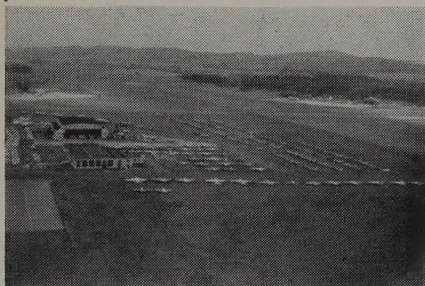
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- Installation



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of the U.S. Business Fleet
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Denver, Colorado
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READING

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Skyways FOR BUSINESS

The official publication of the National Business Aircraft Association

THIS ISSUE is devoted to the manufacturing industries serving business flying. We wish to express our appreciation to those companies whose cooperation has made this issue possible. Because of the obvious limitations of time and space, we are unable to report all materials received. Much excellent reporting from outstanding manufacturers in the various fields arrived too late to meet our deadline. In subsequent issues, we intend to make use of the late materials received.

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FOUNDED BY J. FRED HENRY, 1942

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GO PLACES IN A COMFORTABLE HURRY

GET THERE FIRST IN A TWIN-BONANZA

The big, beautiful Beechcraft Twin-Bonanza offers more for you than any other business airplane in the six-place field! Here are twelve of the dozens of ways in which the Twin-Bonanza is your best buy: (1) delivers more **power**; (2) has a higher recommended **cruising speed**; (3) carries more **payload**; (4) has greater **range**; (5) gives better **performance**; (6) is more **quiet**; (7) has better **visibility**; (8) compiles a better **safety** record; (9) comes **more fully equipped**; (10) has more **comfort** features; (11) **adapts better** to your individual needs; and (12) has a **higher resale value** than any other airplane in its class!

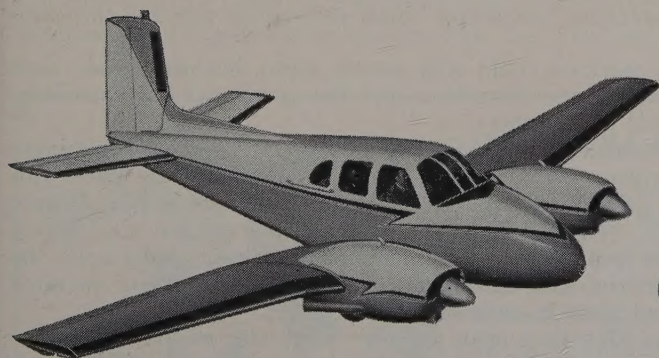
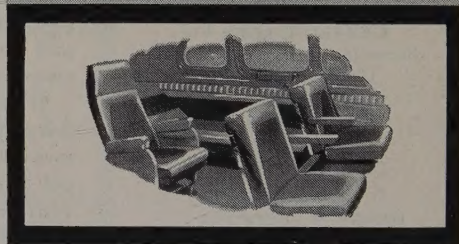
For complete information about the Twin-Bonanza and the finest financing plans in aviation, see your Beechcraft distributor or dealer, or write Beech Aircraft Corporation, Wichita 1, Kansas.

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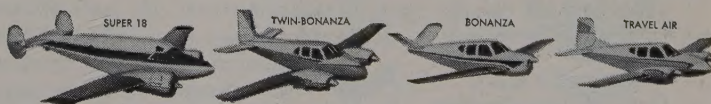
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Six-place BEECHCRAFT Twin-Bonanza. Range — up to 1,650 miles. Speed — up to 240 miles per hour.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Editorial



The Board of Directors and the Executive Staff of the National Business Aircraft Association.

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TOMORROW'S AIR FLIVVER?

A lot of "would-be" fliers know that growth of the personal airplane market has been limited by price tags.

Not only the price tags on small airplanes themselves, but also the costs of hangaring, maintaining and operating them.

While there can be no valid argument against the necessity for such costs, the fact nevertheless remains that all too few people can afford to buy and to operate a present day type of airplane.

It doesn't seem to be too radical to think that perhaps the necessary costs involved in engineering, mocking up, testing, tooling up and producing the present type of personal airplane *has been due to a prevailing concept of just what should constitute a personal airplane!*

The past concept has been that any airplane, no matter how small or how short range its needs, should have *speed* and *range*. Maybe this bottleneck of price stems from a wrong basic concept of just what is needed to satisfy a basic human need.

Up to now all personal airplanes have involved complicated aerodynamics requiring a lot of money, in addition to requiring remote and costly take-off, landing and hangaring areas. It seems fitting and proper to take a long, hard look to see if all this is necessary for average men to fly.

There are a few men in this country who seem to be beginning to cast past concepts aside, who are trying to find out whether a flying machine the average man can afford to own and use can be built. These men are betting that a private air vehicle doesn't need to look like an airliner, that its production doesn't need to get involved in intricate and costly aerodynamics. These men seem to think that any air machine that is fairly simple to operate, reasonably safe and within the means of people to buy will be bought *even if it has limited range and speed*. These men could be right. In this enlightened age, it is hazardous to use the word impossible.

After all, the concept these men have decided to test isn't very different from a similar concept which in recent years has been followed by builders of outboard boats and motors. These small boats and powerplants aren't designed to circumnavigate the globe nor to visit the South Sea Isles. They do not need to be. Anyway, these small outboards have made "admirals" out of hundreds of thousands of landlubbers. The result is that millions of American men, women and children are now enjoying the inland lakes and waterways of our Country and a lot of them do not care if they never see the ocean. The basic concept of building a practical water vessel that the average man can afford has really paid off.

Is there a lesson here for aircraft manufacturers?

Could it be true that the lower altitudes of our air ocean, well below high speed and long range traffic, will, like our inland waterways, be enjoyed by millions when a reasonably priced air machine becomes available?

It could be that a whale of a lot of people don't want nor need to use the Federal Airways, nor to reach the stratosphere. Maybe they have no desire to get as far away from home as Timbuktu before sundown. Maybe they will be very happy to get out of earthbound, hazardous highway traffic on a simple trip to the lake or to visit Aunt Gertrude.

And these very same people, once introduced to the advantages of the air ocean as a medium of travel, will quickly perceive its value to their individual business needs and the transition will naturally follow. Common sense tells us that if the initial investment in money, skill and inconvenience is as high as it is for the popular "business aircraft" of today, a new drive is needed for a means of breaking down that first barrier. The first practical "air flivver" must accomplish this and then also the transition.

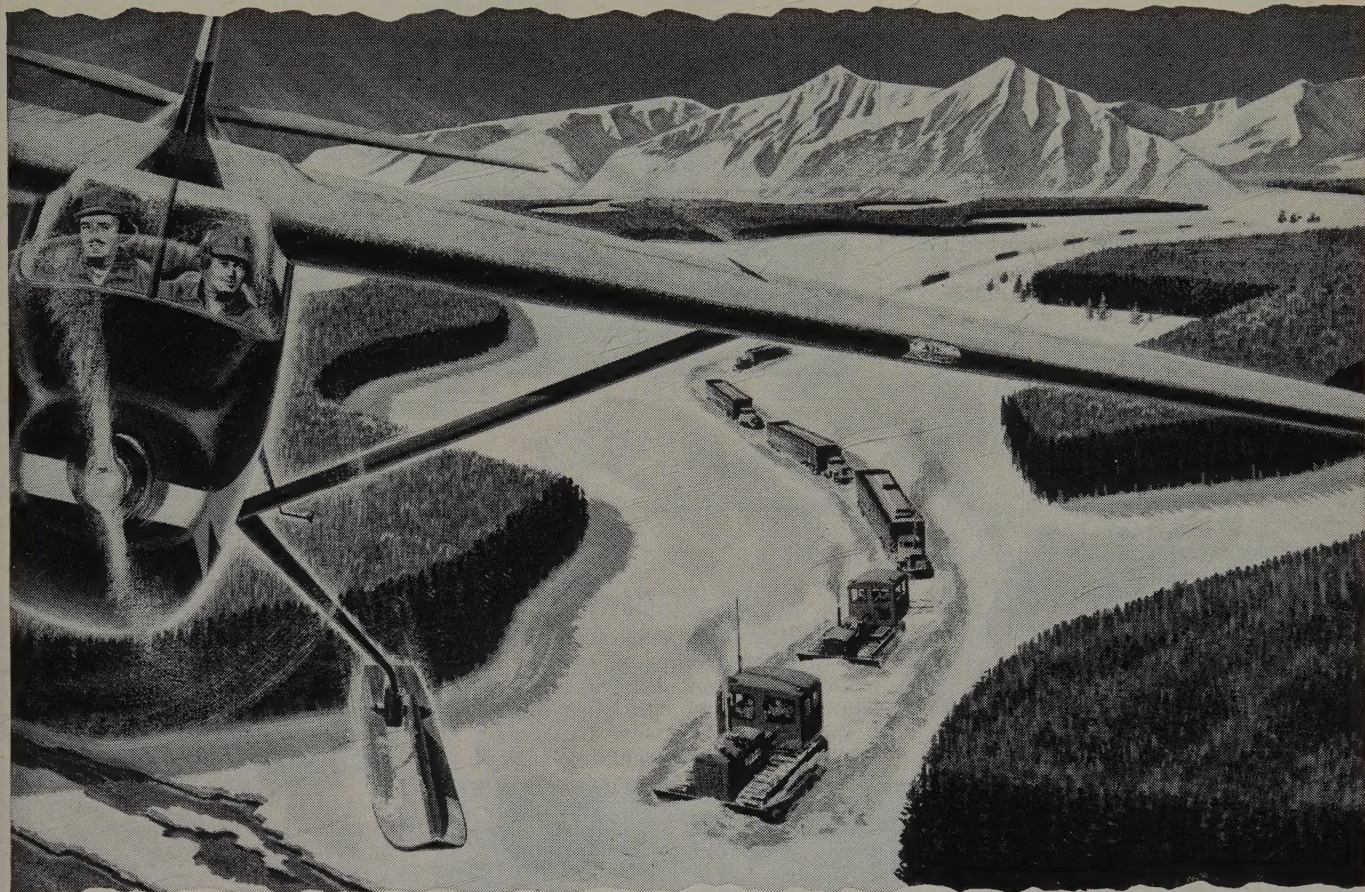
A genuinely low-cost air machine could well satisfy many business needs such as farming, ranching, spraying, forest observation, pipe line and power line patrolling, short distance commuting, and many others.

One man, down Raleigh-Durham way, Russian born, 39 years young, and seemingly determined to crack the airplane price barrier, seems to be setting the pace with his short range, reasonably priced new type air machine. His name is Igor Bensen and he seems to think that the vertical rising type will be the average man's air flivver of tomorrow. He isn't alone; quite a few other manufacturers have seized upon the idea, born in the Armed Services, that lightweight, short-range, and easily operated vertical risers have a destined place in aviation.

More power to these men. May they open the way to greater enjoyment on the part of the average man, woman and child, contribute to industrial and business needs of the world and further expand our country's economy. A reasonably priced air "flivver" in mass production should turn the trick.

PLANE FAX

by STANDARD OIL COMPANY OF CALIFORNIA



Breaking trail by air for Alaska "train"

Flying above the far north's trackless snow, Hawley Evans led this overland "train" carrying radar defense equipment to the shores of the Arctic Ocean. Giving directions by radio, he scouted safe passage over mountains, across steep gorges, between icy lakes in temperatures down to 68 degrees below zero.

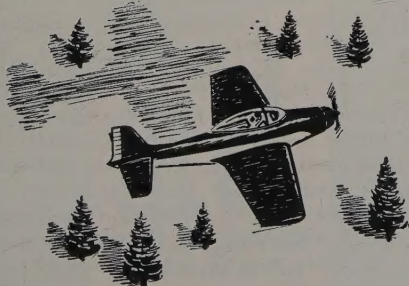
"In that kind of weather," says Mr. Evans, "you really want to be sure of your plane. I play it safe as I can, with Chevron Aviation Gasoline. I've found that Chevron gives me more power on take-offs than any other that I've tried,

and comes through with all the extra power I call for when I'm in flight. Even in bitter cold it keeps my engine running sweet.

"Another thing that helps make my flying safer, I'm sure, is RPM Aviation Oil. When we overhaul customers' engines in our shops at Fairbanks, we can tell the ones that have been on 'RPM'—they're always in good shape. It gives us many extra flying hours; keeps rings and valves free for the life of the engine. Even when it's pre-heated to the boiling point, it never breaks down."

TIP OF THE MONTH

Mr. Evans suggests that planes used in snow country be painted a bright color on top. Silvery surfaces often become invisible against the brilliant white background.



We take better care of your plane



T.M.'S "RPM," "CHEVRON," "PLANE FAX," REG. U. S. PAT. OFF.

NBAA Director's Notes

• Lockheed is shooting for public display of their utility jet transport, the 329, at Denver for NBAA's Tenth Annual Meeting in October. In the 500-mph and higher class—the 329's appearance will mark the first appearance of an American-built jet transport with business aircraft operational ranges and capabilities.

• NBAA members have been asked to participate in the tests of the air-ground public telephone service in the Detroit-Chicago area. With test stations now in operation, test frequencies assigned, American Tel & Tel and cooperating aircraft radio manufacturers are arranging to install equipment in aircraft of NBAA members to be used in the test work.

• Vertol's entry into the business helicopter field with their Model 44, advanced commercial version of the military H-21, is scheduled for appearance in Denver for NBAA's Meeting. Steve Tremper, Vertol's manager-customer relations, and Ed Doherty, Asst. to Vertol's President, previewed the 44 for us a few weeks ago. Airline version of the 44 can seat 15 passengers . . . business version configuration is adaptable to variety of interior arrangements.

• How to get your one-cent per gallon tax refund on aviation gas is explained in the Internal Revenue Service Bulletin #378—"Federal Gas Refund For Non-Highway and Transit Users." Aviation gasoline purchasers are able to collect refunds . . . if they follow the directions listed . . . NBAA members received Special Bulletin on this early in August.

• In the first 20 days after 123.0 mcs was authorized by the FCC as a special service frequency, 11 stations were authorized to go on the air. FCC spokesman said the rush by fixed base operators was far greater than ever recorded when the now-popular 122.8 was made available.

• NBAA-sponsored, the 123.0 mcs frequency for airports with control towers, provides business aircraft operators with safety and ground facilities pre-arrival information not previously available.

• Recent visit to Strategic Air Command Headquarters at Omaha by Civil aviation representatives gave the observers a close-up look at the management, operations and some of the problems of the SAC Command.

Interesting sidelight was revealed on application of in-flight refueling . . . and how headwork, flying skill, deter-

(Continued on page 69)

ELWOOD R. QUESADA, head of AVIATION FACILITIES PLANNING GROUP



Elwood R. Quesada, recently appointed Presidential Asst., is head of the Aviation Facilities Planning Group. Mr. Quesada, who has served as director and officer of Olin Industries and Lockheed Aircraft Corp., was Commanding General of the 9th and 12th Fighter Commands and Deputy Commander of the Northwest Africa Coastal Air Force during WW II. After the war he served as Cmdr-in-Chief of Joint Task Force Three, conducting nuclear tests at Eniwetok. His experience also includes endurance flying, mail flying, and technical assistance to the Argentine Air Force. He has been awarded the DSM, DFC, Legion of Merit, Air Medal, Purple Heart.

Suite 344

Just a few more days until NBAA's Tenth Annual Meeting—10 years of selfless, stubborn, determined efforts, for which ten years ago, or even five years ago, it was doubted as to the future existence of business flying.

Today, we all know that general aviation, a category which includes all flying except military and scheduled airline operations, is the fastest growing segment of America's total air potential.

Even though our strength today is solved, think how much more it would be if those outside of the Assn. would realize that the benefits that accrue to them are being paid for by only 1/30th of the eligible business aircraft owners. Your Assn. can be exactly what you will make it.

From my perspective in the short span of five years associated with your National Headquarters, a great satisfaction of witnessing continued growth, prestige and influence, has been one of the greatest enjoyments experienced in my "blank" years of secretarial duties. Let's not forget that we owe a great debt of gratitude to our past and present Board of Directors, and especially to the Presidents of the Association; namely, William B. Belden, Republic Steel Corp.; Cole H. Morrow, J. I. Case Co.; Henry W. Boggess, Sinclair Refining Co. and Joseph B. Burns, The Fuller Brush Co.

We at National Headquarters had the pleasure of seeing one of the future turbo-prop business aircraft recently. Henry Schiebel, Jr., Mgr., Commercial Aircraft Sales, Grumman Aircraft Engineering Corp., displayed their 159 model.

Too, "David Crockett, Jr.," Military Sales Representative for Lockheed's Georgia Division at Marietta, displayed the model of their 329 Utility Jet Transport.

One of the happiest pilots we know today is Stan Smith, Chief Pilot, New York Wire Cloth Co. Final arrangements have been made for a "brand new" Cessna 310-B. Lots of good luck, Stan, to you and your company.

Ross Bennett, Chief Pilot, Sangamo Electric Co.; Frank Cole, United Airlines; Ken Skinner, Jeppesen & Co.; Hank Harris, Harris & Porter; "Woody" Wood, Gillette Company; Scotty Martin, American Optical Co.; L. L. Swartz, Bendix Products Div., Bendix Aviation Corp.; were welcome visitors of NBAA.

NOTE TO ALL NBAA ACTIVE PILOTS: Bill Vance, Rollins Burdick Hunter Co. says he still has some Business Pilots' Disability Insurance policies that he wants to get rid of. As you know it's a new protection for the man whose income depends on flying. New, low cost income insurance that pays income loss claims of up to \$100, \$150, and \$200 a week at a cost of as little as \$13.49 to \$16.74 per year. This policy is tailored to the special needs of pilots of business and commercial aircraft, provided by a Special Insurance Committee of NBAA. For full details contact Bill Vance, Rollins Burdick Hunter Co., 231 South LaSalle Street, Chicago 4, Ill. or NBAA National Headquarters.

MAILINGS: Application for authorization to operate aeronautical advisory station (Special Service Freq. 122.8 and 123.0); NBAA Annual Safety Award Applications for both Company and Pilots for 1957; Nominating Committee notice; Pilot Training Accident, Capital Air Lines DC-3, Clarksburg, Md.; Fatal Business Aircraft Accident, Lockheed Lodestar, Nakeen Cannery, Naknek, Alaska; Selection of Miss Business Aviation, 1957; Notice of Annual Meeting, proxy, Registration form; Housing Form for non-exhibitors; Safety Bulletin; Directory of Business Aircraft, CAB Regulation 57-59; Federal Gas Tax Refund for non-highway users; Military Non-Compliance with Civil Air Regulations creating extra hazards for business aircraft.

"C.M."

How are
you solving
your
short haul
problem?



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to your crew...
your own air
personnel can be
trained by Bell to
fly and service
your helicopter.
Pilots and
mechanics convert
quickly, expertly
after Bell's
thorough
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You've noticed it in your company: so much of today's *executive travel* is not long range at all... it's hop-skip-jump, by auto or taxi. You hop from one plant to another... skip over to see an important nearby customer... jump from office to airport. All of it may be within a hundred mile radius of your office. Yet, how this ground travel eats up your time!

Today, several hundred companies and individuals are using the Bell helicopter as their short haul specialist. By getting them across creeping traffic with portal-to-portal convenience, the Bell saves hours of needless time en route. Its "go anywhere, land anywhere" mobility... with 1235-lb. load and 300-mile maximum range... turns waste time into payoff time.

What kind of Bell suits *your* outlay? How much does one cost; how much to operate? If you'll drop us a note on your letterhead, we'll give you all the facts... plus some pretty surprising reports from air fleet operators, chief pilots and company heads. We'll also be happy to tell you about Helicopter Charter Service and Bell's popular Lease-Purchase Plan. Why not learn more about the Bell now... how it can fill the gap in your fleet to give you *total flexibility*. Address Dept. 5A, Bell Helicopter Corporation, Fort Worth, Texas.



FORT WORTH, TEXAS

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See Our Exhibit at the NBAA Convention

AIR YOUR VIEWS

Dear Editor:

As an Air Route Traffic Controller for the CAA, I find each issue of SKYWAYS most interesting and informative but the Center copy is in such demand, I'm not always lucky enough to get my hands on it, and so, in order that I might not miss a copy, here is my check for \$4.00 for a 1 year subscription to SKYWAYS magazine.

Thanks to the special registration numbers used by some of the NBAA members, we have come to recognize such familiar planes as N4PG, N5PG, N1X, N2X, N3X, N1M, N10CR, N100P, etc. We've found that with the high standards maintained by your organization, some of the tension of the job is alleviated when we recognize with whom we are working. Not that there aren't many top-notch unaffiliated pilots operating IFR, but speaking for myself, I like to know with whom I'm working, and if he's from NBAA, I know I'm going to get co-operation and prompt and accurate reports.

Very truly yours,
Traffic Controller, CAA

P.S. Due to existing CAA personnel regulations, the reproduction of any of the above comments in your magazine must necessarily appear without my name.

Mr. William K. Lawton
Executive Director and Secretary, NBAA
Dear Mr. Lawton:

Subsequent to a number of years in the aviation industry, which include pre-World War II flight instructing, overseas captaincy with our No. 1 flag airline, I find your excellent publication, SKYWAYS the most informative in the field.

At the convenience of your office, please advise me as to the requirements and procedure requisite to membership in the NBAA.

Very truly yours,
Albert DeRonde
Chief Pilot

To the Editor:

I saw your Editorial in the Feb. 1957 issue and would like to say that I consider that a National Civil Air Show would be of a great benefit to Aviation. It is unfortunate that it got into the hands of a group that decided to fold it up and quit, but I agree with you thoroughly that there should be a tremendous amount of interest in continuing it.

Yours for 1959 or any other year you get it started.

Edwin Earnshaw
Kansas City, Mo.

The Editor:

Much has been written in your magazine and other news sources concerning air safety and elimination of mid-air collisions.

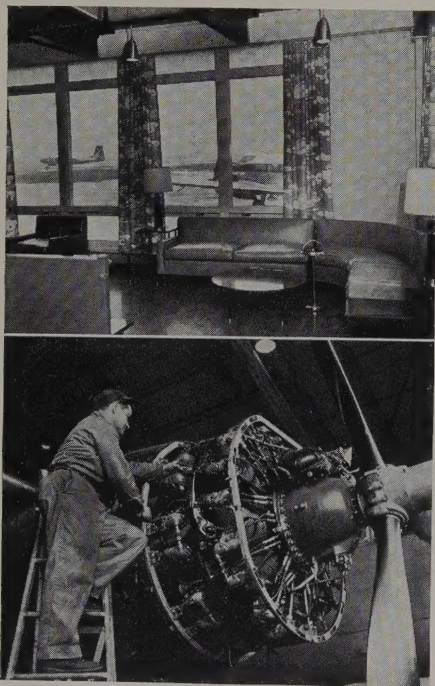
This airport is one of many where airline scheduled operations are carried on with other mixed flying, no control tower.

We in the ATCS (Air Traffic Communication Station) do our utmost to help safety in these instances, but we need co-operation. Air carrier pilots communicate with us prior to entering the local area, and when departing, so we can exchange traffic information. But too many business aircraft, ranging from Cessna 172s to DC-3s, enter our pattern and leave without calls.

If that is contributing to air safety, then the government might well save a large part of the money now expended for the maintenance and operation of some 500 ATCSs.

Business pilots have as much responsibility for air safety as the military or air carrier and they conduct many operations at airports which are control airports (see CAR 60), but where no tower functions. Why not use what aids are available even tho' they might not be all that could be desired?

Airways Operations Specialist, CAA
[Name withheld upon request.]



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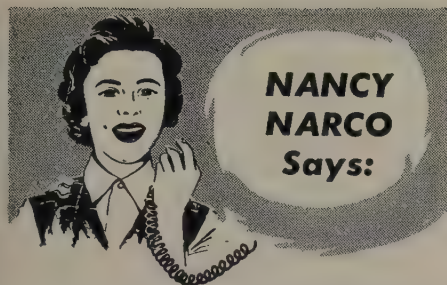
A Full Range of Aircraft Services & Conveniences For Both Pilot and Passenger



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NEWARK AIRPORT, NEWARK, NEW JERSEY MARKET 2-5128





LIKE THE Hi-Fi enthusiast says, "If you don't have Hi-Fi you only hear half the music." The same applies to the pilot who uses only Sectional or Regional (WAC) aeronautical charts.

NOTHING WRONG with charts, mind you, and you certainly want current ones in your airplane, but you do twice the work and get half the navigation information if you fly by charts alone. How come? That's easy—Omni. The way they're plugging in VOR stations nowadays, the regular charts just can't be kept up to date with the most important navigation assistance you can use.

FOR EVERY prominent check point which a map might give you on a typical 200-mile cross-country, you've got a hundred check points with your Omni . . . actually, an infinite number of check points. In other words, with Omni you can check your position every minute of the way on almost any route. That is, if you have up-to-date radio charts. The Sectional charts, as you know, are revised now only twice a year.

I DID a little checking, and between Boston and Washington there are eight new Omni stations along the route or on either side for cross bearings that aren't shown on the latest Sectional aeronautical charts. See what I mean? Flying by Sectional alone makes the Boston-Washington trip quite a task—three big charts to wrestle with plus a lot of pilotage, especially if the visibility is down and every town and city looks alike. With a radio chart, a single piece of paper does the trick plus giving you a lot more navigation information.

IN CASE you're not familiar with radio charts, there are two sources. Jeppesen in Denver and the U.S. Coast and Geodetic Survey offer radio chart service on an annual subscription basis, providing you automatically with new route charts, whenever new radio facilities are added or frequencies changed.

THESE CHARTS certainly save cockpit clutter and only infrequently will you have to refer to a regular chart. For instance, Jepp Chart 7-8 takes you all the way from Memphis to Albuquerque. Naturally, you should always have Sectional or WAC charts for your whole route on board for the final part of a trip to an airport not served by a radio facility, or for the occasional times when radio aids are not available.

WITH A good Omni and radio charts, life sure get easier.

See you next month.

Nancy

NARCO • Fort Washington, Pa.

P. S. If you'd like a FREE Copy of our little booklet "How To Fly Omni," just write me, c/o Narco, Fort Washington, Pa.

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More channels, increased transmitting power, tripled band width, whistle-stop tuning, increased speaker output—all these up-to-date features plus many others are offered in the sensational new Omnigator Mark II. Printed circuits plus the most advanced electronic refinements make all this added performance possible in the same compact single-package navigation and communications unit which has made the Omnigator the most popular, the most respected, the most accurate (proved by government test) of all popular business-plane Omnis.

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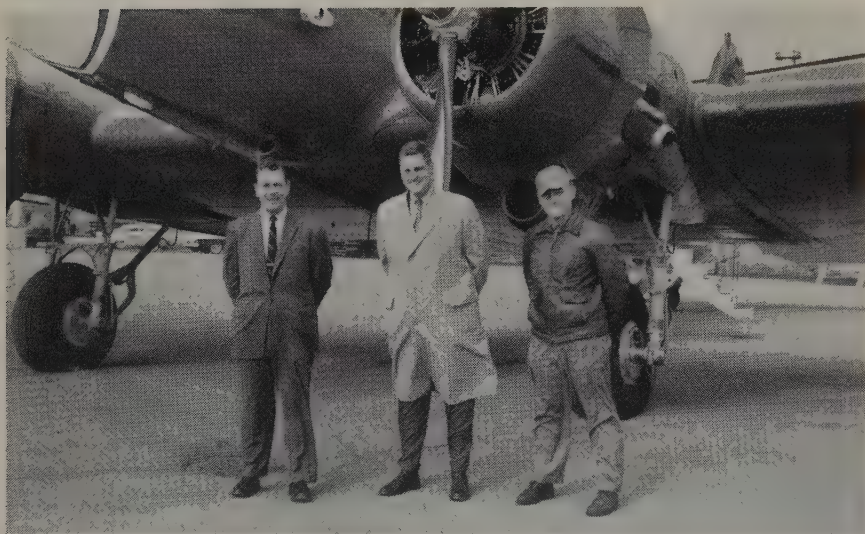
NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

The Heussler DC-3

By J. Sheldon Lewis

Chief Pilot

Thatcher Glass Manufacturing Co., Inc.



HEUSSLER AVIATION Pres. Donald A. Heussler (Center) is joined by Chief Pilot Jack B. Prior (l) and Maintenance Chief Charles Wolfe (r) in front of the de luxe conversion of the company DC-3. So luxurious and so thoroughly planned that it attracts attention everywhere, the Heussler DC-3 sports this tastefully appointed interior (below).



Every now and then, it is our privilege to see an airplane that is a real show-stopper. It may be something new and radical such as a landing Boeing 707 or an F-104 hitting MACH 1 in a climb. Seldom, however, does that Grand Old Lady of the skies, the omnipresent DC-3, rate more than a passing glance. It is much too old and much too commonplace to be gawked at. It is, therefore, an unusual treat to see an outstanding DC-3, and such a "3" is N175W, owned by Heussler Aviation of Buffalo, N. Y., and gathering crowds wherever it goes.

About a year ago, Don Heussler, the personable young head of Heussler Aviation, called in his Chief Pilot, Jack Prior, and told him that they were going to get a DC-3. Right then and there, they sat down together and started working out the details of this beautiful bird, so that when they finally bought a basic DC-3 and ferried it down to Remmert-Werner at St. Louis, the details of interior appointments, radio and electronics, instrumentation and other components had already been worked out many times over. Herein lies the key to the whole business, and take heed ye who are thinking about a conversion of this nature. N175W is probably one of the most well-thought-out Executive DC-3's that ever came to Remmert-Werner. The plane was delivered to Remmert-Werner the afternoon of Dec. 29, 1956, and was flown away on Mar. 23, 1957, just 73 working days later, certainly a record considering the size and complexity of the conversion. Slightly less than 20,000 man-hours went into the conversion, not including those of hardworking Chuck Wolfe, who is in charge of maintenance for Heussler.

The ship has a geared rudder permitting a 1350 hp takeoff (R1830-94 engines) and a gross weight of 26,900 lbs. At 9000' it will true out an honest 205 mph, drawing 64% power and 216 TAS at 14,000' using the same power. With the addition of clam shell gear doors, this will doubtless be improved.

Eleven hundred gal. of fuel can be carried in the wing tanks, giving a maximum range of about 2350 mi. for over-ocean flying, and a plug-in Loran set is provided for the same reason. Electronically, the ship is the answer to a pilot's prayer. Loran, plus Bendix RDR-1 X-Band Radar complement the Collins AP-101D autopilot, which in turn is supplemented by an FD-104 Flight Director, Approach Coupler, Automatic Altitude Controller and a Collins Integrated Flight System.

Communications and navigational radio are in keeping with the quality decor. Collins 176-6 transmitter is installed, plus a 51X1A receiver and two 51R3 280 channel ARC-1 standby omni receivers. Smaller items include dual "bird dogs," isolation amplifiers, marker beacons, dual cockpit speakers, flush iron core loops, etc., which we'll just gloss over and say that they are there.

Neither space nor readers' patience would permit an entire description of

(Continued on page 73)



SMALL TOWNS OR BIG CITIES *Esso is there...at 600 airports from Maine to Texas!* You just can't beat those Esso Aviation Dealers for prompt and courteous service. (And, as you know, there are no better products than Esso fuels and lubricants!) With an Esso Credit Card, charge-account convenience is yours at *any* of the Esso Aviation Dealers. With it you can even charge tire and battery service, landing fees, overnight in-transit storage and most minor emergency repairs — as well as gasoline, oil and lubrication. Better get one! And, next time, put down where there is an Esso Aviation Dealer.



FREE TO PILOTS! See your nearby Esso Aviation Dealer for your free copy of "The Esso Co-Pilot"—a complete directory of Esso Aviation Dealers.



National Business Aircraft Association, Inc.

Pre-Meeting and Forum Activities



Denver, October 2-3-4

NBAA Convention

It is almost impossible to put together so many pilots and others associated with aviation without having a lot of fun. This is one category in which the Annual Forum and Business Meeting never falls short; and this is, in itself, a compelling reason to attend.

The serious business of the meeting is, in essence, to go away a little smarter than we were when we come. The best way to accomplish this is for everyone to participate to the best of his ability, and to share one another's information and experience. After all, that is why we all belong to NBAA, and that is why NBAA continues to grow and serve an increasingly vital need in Business Aviation.

This is your meeting, planned for you to the best of our ability. So don't keep that information to yourself. Stand up and be counted!

*Torch Lewis, Chairman
FORUM COMMITTEE*

Tentative Program as of August 5th

TUESDAY, OCTOBER 1st

REGISTRATION OPENS

12:00 Noon to 6:00 P.M.

Cosmopolitan Hotel, Mezzanine Floor

EXHIBIT AREA OPENS

2:00 P.M. to 6:00 P.M.

Mile High Center Building

Aircraft, aircraft parts and accessories, radio, instrument, engine, on display daily throughout NBAA's entire three-day program.

**WEDNESDAY, OCTOBER 2nd
TENTH ANNUAL MEETING AND FORUM**

REGISTRATION (continues)

8:00 A.M. to 7:00 P.M.

Cosmopolitan Hotel, Mezzanine Floor

EXHIBIT AREA OPENS

9:00 A.M. to 6:00 P.M.

Mile High Center Building

(Immediately adjacent to the Cosmopolitan, Brown Palace and Shirley Savoy Hotels)

ANNUAL MEMBERSHIP BUSINESS MEETING

10:30 A.M.

Cosmopolitan Hotel, Silver Glades Room

- (a) Annual Report of NBAA Activities
Joseph B. Burns, President, NBAA
Fuller Brush Company
- (b) Treasurer's Report
Gerard J. Eger, Treasurer, NBAA
International Harvester Company
- (c) Election: Members of Board of Directors
- (d) Discussion of NBAA's Policies
Question and Answer Period
- (e) Adjournment of Annual Meeting

TENTH ANNUAL MEETING OPENS

2:00 P.M. to 4:30 P.M.

Discussion of Aircraft by Type

- (a) DC-3
- (b) Lodestar-Learstar
- (c) Beechcraft D-18-S
- (d) Light Twins
- (e) Convair-Ventura

Moderator-led panel discussions on specific aircraft operating and maintenance problems with full floor-discussion by the aircraft owners and operators, maintenance centers and factory representatives.

"FIRST-NITER" HOSPITALITY HOUR

6:30 P.M. to 7:30 P.M.

Cosmopolitan Hotel, Century Room

FIRST NITER BANQUET

7:45 P.M. to 10:00 P.M.

Cosmopolitan Hotel, Silver Glades Room

Greetings and Welcome

Official Presentation:

Miss Business Aviation, 1957

Presentation:

Women's Aeronautical Association of Kansas

BUSINESS FLIGHT SAFETY TROPHY

Distinguished Guest Speaker:

The Hon. James T. Pyle

Administrator, Civil Aeronautics Administration

THURSDAY, OCTOBER 3rd

REGISTRATION (continues)

8:30 A.M.

Cosmopolitan Hotel, Mezzanine Floor

EXHIBIT AREA OPENS

9:00 A.M.

Mile High Center Building

PANEL and FLOOR DISCUSSION

9:15 A.M. to 10:45 A.M.

"The CAA's Business Flying Program"

How the CAA's newly developed program works, its training programs, field work, and how company management and pilots can benefit.

Panel participants will include CAA business flying inspectors, program administrators and business aircraft operations personnel.

COFFEE BREAK

10:45 A.M. to 10:50 A.M.

PANEL AND FLOOR DISCUSSION

11:00 A.M. to 12:15 P.M.

"Company Management Policies"

Detailed review of various types of business aircraft operational policies as developed by various NBAA member companies. Accounting methods, dispatch procedures, load requirements, organizational command, training requirements will be examined and discussed with representatives of all sizes and types of business flying activity.

"GET ACQUAINTED" LUNCHEON

12:30 P.M. to 1:45 P.M.

Shirley Savoy Hotel, Empire Room

Sponsor:

Insurance Company of North America Companies
Philadelphia, Pennsylvania

Distinguished Guest Speaker: To be announced

PANEL AND FLOOR DISCUSSION

2:00 P.M. to 4:00 P.M.

"Weather Flying and the Business Aircraft"

- (a) Discussion of private weather facilities available to supplement U. S. Weather Bureau, and their value to business aircraft operations.
- (b) "Thunderstorm Flying by Radar"
Mel Balzer, United Air Lines, will present flight training film and discussion of techniques used in radar-weather flying.

"PICK'N SHOVEL"

6:30 P.M. to 11:30 P.M.

COLORADO HOSPITALITY NIGHT

Shirley Savoy Hotel—Colorado, Continental and Lincoln Rooms

Colorado's Fabulous Mining Camp Days—recreated in authentic style will provide the background for an evening of fun, food and frolic. Entertainment, music and all the fixin's!

FRIDAY, OCTOBER 4th

REGISTRATION (continues)

8:30 A.M.

EXHIBIT AREA OPENS

9:00 A.M.

PANEL: TURBO-PROP BUSINESS AIRCRAFT SYMPOSIUM

9:15 A.M. to 12:00 Noon

(Part 1)

AIRFRAME MANUFACTURERS: Viscount, Fairchild, Grumman, On Mark; Lockheed

ENGINE MANUFACTURERS: Allison, Rolls Royce, Napier

To give facts and performance figures on their power plant and aircraft performance.

NBAA's ANNUAL AWARD LUNCHEON

12:15 P.M. to 2:00 P.M.

Honoring those pilots who have maintained accident and injury free safety records

Presentation of Certificates and Awards to:

500,000 Mile Pilots

1,000,000 Mile Pilots

Presiding: Joseph B. Burns, President, NBAA

TURBO-PROP BUSINESS AIRCRAFT SYMPOSIUM

2:15 P.M. to 4:00 P.M.

(Part 2)

Present-day turbo-prop aircraft operators will discuss their transition training from piston to turbo-props, operational policies, maintenance cycles. Invited to participate are Capital Air Lines, Standard Oil Company of California and the U. S. Air Force.

NBAA ANNUAL HOSPITALITY HOUR

6:30 P.M. to 7:45 P.M.

Cosmopolitan Hotel, Silver Glades Room

NBAA TENTH ANNUAL BANQUET AND HONORS NIGHT

8:00 P.M. to 10:30 P.M.

Presentation of NBAA's ANNUAL SAFETY AWARDS to MEMBER COMPANIES

Presentation of NBAA's ANNUAL MERITORIOUS AWARD:

Recipient to be announced

Distinguished Guest Speaker:

Elwood R. Quesada,

Special Assistant for Aviation Facilities Planning to the President of the United States.

NBAA's TENTH ANNUAL FORUM ADJOURNS

10:35 P.M.

SATURDAY, OCTOBER 5th

SPECIAL WEATHER BRIEFING

9:00 A.M.

By: United Air Lines' Forecasters for all NBAA pilots.

Place: Briefing Room, United Air Lines, Stapleton Air Field.

Complete summary of current weather and forecasts of enroute and terminal conditions.



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Hawthorne Airport
Long Beach Air Oasis Company CNF
Long Beach Municipal Airport
Oakland Bayaire Avionics CNF
Oakland Municipal Airport
Palo Alto Fred A. Becker Aviation Radio C
Palo Alto Municipal Airport
San Jose Wright Brothers Aviation CNF
San Jose Municipal Airport
Santa Ana Martin School of Aviation CN
Orange County Airport
Santa Monica
Executive Radio & Aircraft Service Inc. CNF
Santa Monica Airport
Van Nuys Plane Service, Inc. CN
Van Nuys Airport

COLORADO, Denver

Clinton Aviation CNF
Stapleton Airport

CONNECTICUT, New Haven

Usher Aviation CNF
Municipal Airport

DELAWARE, Wilmington

Atlantic Aviation Corp. CNF
New Castle County Airport

DISTRICT OF COLUMBIA, Washington

Butler Aviation CNF
Washington International Airport

FLORIDA, Lantana

E. Farnell & Company, Inc. CNF
Palm Beach County Airport

GEORGIA, Atlanta

Southern Aero, Inc. F
Municipal Airport

ILLINOIS

East Alton Walston Aviation CNF
Civic Memorial Airport
Springfield Capitol Aviation CN
Municipal Airport

KANSAS, Wichita

Lear, Inc. CNF
Wichita Municipal Airport

KENTUCKY, Louisville

Aircraft Radio Laboratory CN
Bowman Field

MICHIGAN

Detroit Servair, Incorporated G
Detroit City Airport
Grand Rapids Lear, Inc. CNF
Grand Rapids Airport

MINNESOTA

Minneapolis Minnesota Airmotive, Inc. CN
Wold-Chamberlain Field
Rochester Gopher Aviation, Inc. CNFG
Lobb Field

NEW JERSEY, Teterboro

Atlantic Aviation Corp. CNF
Teterboro Airport
Consolidated Instrument Co., Inc. G
Teterboro Airport

NEW MEXICO, Santa Fe

Southwestern Skyways, Inc. CNF
New Municipal Airport

NEW YORK

Buffalo Buffalo Aeronautical Corp. F
Buffalo Airport
Flushing, Long Island Butler Aviation Service, Inc. CN
La Guardia Airport

Lindenhurst, Long Island Dot Airtronics, Inc. CNF
Zahns Airport

Rochester Page Airways, Inc. F
Municipal Airport

Ronkonkoma, Long Island
Air Mar Radio Service, Inc. CNF
MacArthur Airport

NORTH CAROLINA, Charlotte

Southern Flight Service, Inc. F
Municipal Airport

OHIO

Cincinnati Airborne Communications, Inc. CNF
Lunken Airport
Cincinnati Aircraft, Inc. CN
Lunken Airport
Youngstown Youngstown Airways, Inc. CN
Municipal Airport

OKLAHOMA, Tulsa

Tulsair Distributors, Inc. CNF
Municipal Airport

OREGON

Portland Flightcraft, Incorporated CNF
Portland International Airport
Oregon Air-Motive G
Portland International Airport
Troutdale Skyways, Incorporated CNF
Portland-Troutdale Airport

PENNSYLVANIA, Reading

Reading Aviation Service CNF
Municipal Airport

SOUTH CAROLINA, Charleston

Hawthorne Flying Service F
Municipal Airport

TEXAS

Dallas Dallas Aero Service CN
Love Field
Houston Aviation Instrument Manufacturing Corp. G
International Airport
Allied Instrument Laboratories F
Municipal Airport
San Antonio Airnews, Inc. CN
International Airport
Howard Aero Service CF
International Airport

UTAH, Ogden

Southwestern Skyways, Inc. CNF
Ogden Municipal Airport

VIRGINIA, Sandston

Aircraft Radio Service CNF
Byrd Airport

WASHINGTON, Seattle

Airline Services, Inc. C
Boeing Field

WISCONSIN, Milwaukee

Anderson Air Activities CN
General Mitchell Field

CANADA, ALBERTA — Calgary

Foothills Aviation, Limited CNF
Municipal Airport

CANADA, QUEBEC — Montreal

Laurentide Aviation, Limited C
Cartierville Airport



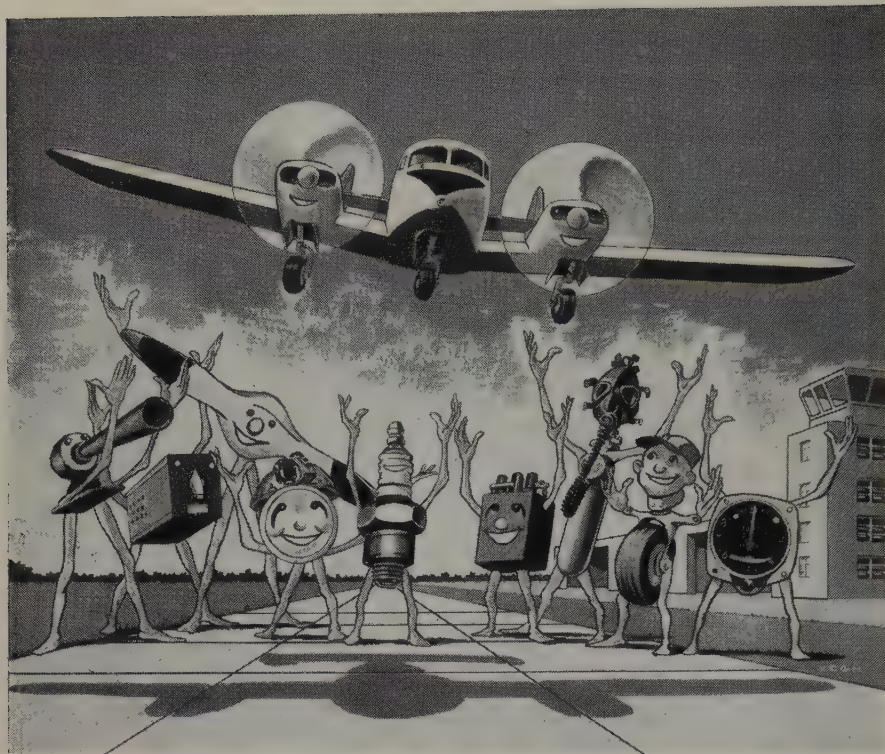
By Russ Brinkley, Pres.

The new OX5 Club roster, including the organization constitution, by-laws and current addresses of approximately 4000 oldtime men and women flyers, is now on the press and will be distributed to members, along with the new OX5 lapel emblems, within a few days. Publication of the membership roll was delayed until after the 1957 annual convention at Kansas City, so that hundreds of new members could be listed in the book. The rosters, in the past, have proved to be of great convenience to members, for reference and particularly during the holiday season when they wish to renew association with friends of the past.

Some interesting statistics were brought to light while the new roster was being compiled. The editors learned that nearly 100,000 years of aviation experience are represented by the clubs' various members. Several pioneers, such as Ernest Hall of Warren, Ohio, are still active pilots even though they started flying soon after the Wright brothers made their first flights at Kitty Hawk. In fact, approximately 75 percent of the club members, despite the 35 to 85 year age bracket, are still licensed as airmen. Basil Rowe, retired chief pilot of Pan-American Airlines, is credited with having the most time in the air, 35,000 hours plus. Some of the World War One pilots, who gave up flying after the Armistice, admit to having less than 100 hours in their log books. Some of these saw actual air combat.

Next to the OX5 roster, the books most dear to the hearts of the pioneers are their scrapbooks which occupy wide attention at every meeting. If there is anything that delays the official opening of a club meeting, it is the pressbook. No one complains, however, so long as he is given the opportunity to show off his own collection of clippings and pictures. Speaking of the pressbook pictures, just about half of them involve crackups, a subject that was always good for the front page in the old days. And for every picture of a crackup, there is a scar to verify it. However, since the OX5 Club is a co-ed organization, the new proud owners frequently have to forego an exhibition of their stitches.





"We Keep 'em Flying"

Air Associates stocks the largest, most complete inventory of aircraft parts and accessories in the aviation industry. And Air Associates' tremendous buying power brings them to you at the most advantageous prices. You can always count on AA's *having* what you want, *delivering* what you want, whenever and wherever you want it. That's why Air Associates is truly your

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Teterboro, N. J.	



Directory

Denver, October 2-3-4

Arrangement of Exhibitors' Booths at the Annual Meeting of aircraft and equipment manufacturers (correct as of Aug. 5th). Listing is in alphabetical order by name of manufacturer, followed by booth number(s).

AC Spark Plug Div., GMC, Flint, Mich.: 210.
 Aero Design & Engrg. Co., Bethany, Okla.: 212-213.
 Aerodex, Inc., Miami, Fla.: 322.
 Aerojet General Corp., Azusa, Cal.: 215.
 Aeroquip Corp., Jackson, Mich.: 202-203.
 Air Associates, Inc., Teterboro, N.J.: 218.
 AiResearch Aviation Service Co., Los Angeles, Cal.: 228.
 Aircraft Marine Engrg., Sepulveda, Los Angeles, Cal.: 110-111.
 Aircraft Radio Corp., Boonton, N.J.: 222.
 American Pamecor: 306.
 Barber Colman Co., Rockford, Ill.: 323.
 Beech Aircraft Corp., Wichita, Kans.: 2, 3-6, 7, 11, 12.
 Bell Helicopter Corp., Ft. Worth, Tex.: 112.
 Bendix Aviation Corp.: 223-227.
 Cessna Aircraft Co., Wichita, Kans.: 401-408.
 Chamberlain Aviation, Inc., Akron, Ohio: 300-302.
 Collins Radio Co., Cedar Rapids, Iowa: 205-208.
 Dallas Aero Service, Dallas, Tex.: 220.
 Fairchild Engine & Airplane Corp., Hagerstown, Md.: 304-305.
 General Electric Co., Schenectady, N.Y.: 307-308.
 Grimes Mfg. Co., Urbana, Ohio: 201.
 Grumman Aircraft Engrg. Corp., Bethpage, N.Y.: 115.
 Howard Aero Service, Inc., San Antonio, Tex.: 216-217.
 Jeppesen & Co., Denver, Col.: 204.
 Lear, Inc., Santa Monica, Cal.: 214.
 Lockheed Aircraft Corp., Burbank, Cal.: 219.
 Minnesota Airmotive, Inc., Minneapolis, Minn.: 209.
 Minnesota Mining & Mfg. Co., St. Paul, Minn.: 303.
 On Mark Engrg. Co., Van Nuys, Cal., and Allison Div., GMC, Indianapolis, Ind.: 315-320.
 Pacific Airmotive Corp., Burbank, Cal.: 309-314.
 Piper Aircraft Corp., Lock Haven, Pa.: 1, 4, 5, 8-10.
 Radio Corp. of America, Camden, N.J.: 200.
 Reading Aviation Service, Inc., Reading, Pa.: 321.
 Wilcox Electric Co., Inc., Kansas City, Mo.: 211.
 Zep Aero, El Segundo, Cal.: 221.

BROADWAY



PILOTS PROVE ABILITIES IN *Powder Puff* DERBY

FIRST Pilot: Alice Roberts, right
Co-pilot: Iris Critchell
Plane: Beechcraft Bonanza



SECOND

Pilot: Doris Eacret, left
Co-pilot: Jean Parker Rose
Plane: Cessna 140

FOURTH

Pilot: Ruby Potter, right
Co-pilot: Marion Craver
Plane: Beechcraft Bonanza

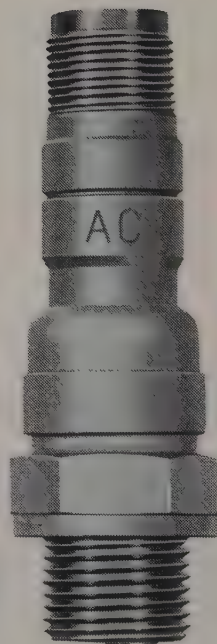


THREE OUT OF FOUR WINNING PLANES WERE SPARKED BY AC!

From San Mateo, California to Philadelphia, Pennsylvania, the 1957 All-Woman Transcontinental Air Race winged its way 2,567 miles! Throughout the race, the crews demonstrated skill and judgment to get the most out of plane performance and weather conditions. Decisions were their responsibility!

When the wheels touched down at the Philadelphia Airport, three of the first four planes in the Powder Puff Derby had been powered to victory by AC Spark Plugs. Yes, ACs were tops in one of the nation's top-flight private-plane contests. The extra reliability and performance of AC Spark Plugs have been proved in millions of hours of flight in military, commercial and private planes.

You'll find AC Aircraft Spark Plugs best for the plane you fly!



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Are Our Airways Antiquated?

By Major Charles G. Weber, USAF

SKYWAYS brings you an Air Force member's point of view regarding air traffic control problems common to business, military, and airline flight.

The author believes that he is somewhat qualified to speak on the subject of aviation having logged over 8,000 hours of flying time in transport and jet aircraft, in all parts of the world.

Far above the earth was a small silver dot, a dot clipping along at 500 mph. No one on the ground could see the dot except personnel continually scanning the surveillance radar located in the airport Approach Control Center. The sky was overcast, occasional rainstorms were in the area, and now and then a flash of lightning could be seen off on the horizon. Inside the jet sat a pilot, highly trained and experienced. He looked down below at the undercast and thought of the poor low-altitude boys struggling along in the turbulence and heavy rain. This high-altitude stuff was literally for the birds; no sweat, plenty of ground speed, and no long intervals between landings. In fact, the expected ground speed was so great that prior to take off he had called the little wife and told her to meet him; plenty of advance warning because it took quite some time to drive through the congested city traffic to the airfield.

The thoughts of high altitude and speed were suddenly shattered when the radio, previously cluttered with conversation of the slow boys below, singled out the dreamer and barked: "Air Force Jet 35014, this is Richmond Radio; maintain 36,000 feet, contact Washington Center over Quantico, expected approach time 1430, delay time 30 minutes; over."

The pilot did some hasty arithmetic gymnastics with the remaining fuel and determined that if the air traffic control boys were correct in their estimated delay time, the jet would surely make a nice pilotless glider. What would the little woman think if he didn't show up after she had driven all the way across town to Andrews Field? It was obvious he couldn't hang around making up his mind; two choices were available. An emergency could be declared or the alternate could be used. Since it was originally established that the pilot was experienced, he elected to proceed to the alternate. He could have declared the emergency at the expense of those below and really fouled up the works. The

change in flight plan was given to Richmond Radio and a course set for Dover, Del.

Today this incident is not uncommon; sometimes the situation becomes so critical that the decision to go to the alternate is waived and an emergency is declared. Sometimes this is due to poor flight planning and sometimes it is due to other circumstances. Many times pilots who have to divert, sit in the cockpit and silently cuss out the air traffic controllers who must have fouled up things along the way.

This allegation might be true, but only in isolated cases. It is not the Air Traffic Control system that causes the delays, but the facilities that support the systems that are at fault. We have progressed from the horse-and-buggy days of aviation in such leaps and bounds that many times the equipment supporting the airplane has fallen far behind. Today the problem of flying from one city to another is no longer a feat of daring but a matter of routine. The problems of instrument flying are no longer mysteries of the crystal ball but everyday happenings. The people of this great nation are becoming more air-minded everyday; because of this a problem has been created in air traffic control.

Many individual studies have been conducted by the military, Civil Aeronautics Authority, Commercial Air Carriers, and joint groups composed of all three to recommend solutions to the air traffic problem. Sound recommendations have been made but in most instances it has been necessary to restudy the recommendations in the light of newly-developed equipment. This reconsideration only pushes back the day of implementation and further aggravates an already overburdened system. Around the corner lurk the turbo-prop and jet airliners as well as the all-jet military air forces. These aircraft when mixed into the hodge-podge of existing aircraft will become a headache for those people who control and operate them.

A look into the past will show us that facilities supporting the air traffic control system consisted of radio ranges, non-directional beacons, ILAS, control centers, and towers. The airports in many instances were situated on the outskirts of the city and were equipped with 6000 foot runways. The runways were lighted with flush mounted lights, such things as threshold and approach lights were non-existent. Aircraft of that era were propeller-driven, operated at low altitude, and compared with today's

aircraft, were low in performance. Today's aircraft operate at all altitudes—they are high performance aircraft capable of crossing the United States in half the time of their predecessor. At present they are also propeller-driven but mixed in with these are the military jet aircraft.

The facilities serving this new era of aircraft have not changed much from the past. We still have the old radio range stations; added to the system are the VOR stations which will eventually replace these old facilities. The old ILAS system still exists but to this has been added GCA to facilitate instrument approaches. The airports have grown somewhat in size but instead of being on the outskirts of the town they are now surrounded by houses. The runways that used to be capable of supporting such tremendous weights of 70,000 pounds are unable to handle the 150,000-200,000 pound giants of today. The airway control facilities are in essence the same, the functions within the system have changed. Today traffic is controlled through the centers and funneled into approach control agencies located at the major air terminals. The approach control agencies in conjunction with the control towers at major air terminals now have surveillance radar to facilitate the flow and movement of air traffic. Even with the improvements mentioned this is still not adequate to handle a high-density area when weather conditions are really bad.

Today it is not uncommon to file a jet instrument flight plan for a specific altitude, taxi out to take-off, and find out at the end of the runway that the altitude requested is filled. The clearance given to the tower by the air traffic control agency authorizes another altitude or a 1000 foot-on-top flight. All calculations made on the flight plan have gone for naught. It then becomes a matter of going back to operations to compute a new flight plan using new wind data or taking off and attempting to adjust the flight plan while enroute, always hoping that the altitude requested will be open when away from the congested area. Usually the latter decision is made and results in an adjustment for the traffic controllers each time an ETA for a checkpoint is missed or changed. There was a day not too long ago when it was possible to take off in a jet aircraft with a requested altitude, far above the normal air traffic, and have it assigned. That day has gone too; it is just as easy to receive a 1000

(Continued on page 72)

BUSINESS AIRCRAFT

Today and Tomorrow

Splitting of the atom more than a decade ago started a chain of decentralization which is becoming more intensive among industries.

The spreading of industrial operations to take advantage of skilled labor markets, proximity to sources of materials, and easier vantage points for distribution of their products has thinned the time and attention which executives can give.

For more than a decade, America has been on the move—its citizens and its industry—to take advantage of the changing economy, convenience of living and doing business, and the changing requirements of faster-paced competition in this age.

Keeping pace with the times and preparing for the future have been the manufacturers of corporate aircraft who are producing from their production lines and drawing boards the safe and fast links which assure centralization in an era of decentralization, providing efficient travel for executives.

SKYWAYS, in this section, offers a spot check of the aircraft which are, or will be, available to the corporate market. These planes play an important part in the civil market which owns and operates 38 times more aircraft than the airlines; flies more than 12 million hours a year; and bought almost \$10 million worth of new planes in one month of this year.

In subsequent issues, SKYWAYS will continue its custom of reporting on flight evaluations of new aircraft, as well as modifications and conversions.



680S AERO COMMANDER

Similar in configuration and seating capacity to the 560E, the Aero Commander 680 Super is powered by two Lycoming GSO-480-A1A-6 supercharged engines. Their 340 hp provide maximum recommended cruise of 230 mph at 70 per cent power; normal cruise of 224 mph at 60 per cent power.

Fuel consumption of 31 gph gives a 1,350-mile range on standard fuel capacity of 223 gallons. Service ceiling is 24,200 feet. Absolute ceiling, one-engine-out, is 15,000. Dimensionally, the 560E and the 680 Super are identical, except for a wingspan of 44 feet on the Super and 49 feet on the 560E. Gross weight of the 680 Super is 7,000 pounds, with a useful load of 2,670 pounds, as compared with the 560E gross weight of 6,500 pounds and a useful load of 2,200 pounds. Absolute ceiling of the 560E with one engine out is 8,000 feet.

Price of the Aero Commander 680 Super is about \$89,000.



E-50 BEECH

First supercharged business plane in the Twin Bonanza series is the E-50. An all-metal 6-place aircraft with retractable tricycle landing gear, the E-50 is powered with Lycoming GSO-480-A1A-6 engines developing 340 hp. Propellers by Hartzell are hydraulically controlled, full-feathering.

Supercharging gives the E-50 a maximum recommended cruise of 212 mph at 65 per cent power. At this speed, the E-50 consumes 37 gph, giving a maximum range of 871 miles with standard 180-gallon tanks, and 1,160 miles with 50-gallon auxiliary tanks. At normal cruise of 204 mph, this plane will travel as far as 1,290 miles with auxiliary tanks (including 45-minute reserve), and 976 miles with standard fuel capacity. Gross weight is 7,000 pounds, of which 2,560 is useful load.

Service ceiling is 24,800; one-engine-out absolute ceiling, 12,550. Standard price is \$88,000.

CESSNA 310

The Cessna 310, a 5-place light twin with retractable tricycle landing gear, is powered by two Continental O-470-M 240-hp engines fitted with Hartzell 2-blade constant speed props. Maximum recommended cruise of 205 mph gives a range of 612 miles with 45-minute reserve.

Range at 193 mph (60 per cent power) is 645 miles with a 45-minute reserve. Fuel consumption at 60 per cent power is 24.2 gph; standard fuel capacity is 100 gallons. Optional auxiliary wing tanks add 30 gallons. Gross weight is 4,600 pounds, useful load, 1,700 pounds. Service ceiling is 20,000 feet; absolute ceiling, on one engine, is 8,700 feet. Sea-level rate of climb: 1700 feet per minute. The 310 climbs at 380 fpm with full load on one engine. Seats are foam rubber, with adjustable rear and reclining front seats. Luggage compartment holds up to 200 pounds, is accessible from cabin in flight. Priced at about \$54,000.



DE HAVILLAND DOVE

Latest in a series of the *Dove* light transports produced by DeHavilland is an executive model for 5-6 passengers. An airline model for 8-11 passengers is also available. Powered with twin DH Gypsy Queen 70 Mk-2 380 bhp engines, the *Dove* is equipped with hydromatic constant-speed propellers.

Gross weight of 8,800 pounds includes a useful load of 2,791 pounds, with six passengers. Fuel load of 202 gallons gives a range of 785 miles at maximum cruise of 202 mph at 8,000 feet. Fuel consumption here is 42 gph. At a normal cruise of 179 mph, a range of 875 miles is achieved, with fuel consumption at 32.8 gph. Service ceiling is 20,000 feet; one-engine-out ceiling, 8,000 feet. Engines, complete with oil tank and all accessories, form self-contained units detachable and interchangeable, right and left. Price is about \$113,800 for the standard model.

Another DeHavilland executive offering is the 8-place Heron, priced at about \$218,335.



TRECKER ROYAL GULL

The Trecker P136-L1 *Royal Gull*, a 5-place amphibian with high gull wings and pusher engines, combines airframe and wings built by Piaggio with American engines (Lycoming G0-480-B1B, 270 hp), components and accessories. Hull is monocoque construction with six watertight compartments.

Gull's maximum cruise is 168 mph. Maximum range (at 156 mph) is 880 miles. Sea level rate of climb is 1,200 fpm. Service ceiling is 18,500 feet; one-engine absolute ceiling is 4,600 feet. Gross weight is 6,000 pounds; useful load, 1,570 pounds. The *Gull* takes off in 1,380 feet as a landplane; 1,410 feet from water. Fuel capacity is 190 gallons. Cabin interior finished (in Italy) in genuine leather. A 20,000 BTU heater is standard equipment. Hinged "clamshell" cowling facilitates engine maintenance. Hartzell props feather automatically if oil pressure fails. Retractable sea-rudder operates with air-rudder for water-taxiing.

Price of the *Royal Gull*: about \$74,000.





APACHE PIPER

Introduced in 1954, the Piper *Apache* has been one of the most successful light twin-engine business aircraft. A 4-5 place all-metal low-wing plane with retractable tricycle landing gear, the *Apache's* two 150-hp Lycoming O-320 engines give a maximum cruise of 170 mph at 75 per cent power.

Depending on selection of fuel tanks, the *Apache* has a range from 800 to 1,200 miles. Standard fuel capacity is 72 gallons. Two 18-gallon tanks may be added to the wing-tips. On the Super Custom *Apache*, this 108-gallon capacity is standard equipment. Service ceiling at gross weight of 3,500 pounds is over 20,000 feet. One-engine-out absolute ceiling is 6,750 feet. Rate of climb at sea level is 1,350 feet per minute. The *Apache* will take off and land fully loaded in less than 900 feet.

Standard equipment on the *Apache* includes a 20,000 BTU Southwind heater, leather upholstery, complete, soundproofing, removable rear seat.



SUPER 18 BEECH

Super 18 Beechcraft is a 7-9 place executive aircraft with two Pratt & Whitney R985-14 ANB engines of 450 hp. Fully retractable landing gear is fitted with tubeless tires as standard equipment. Of a gross weight of 9,300 pounds, 3,250 pounds is useful load. Maximum range is 1,216 miles at normal cruise of 205 mph (57 per cent power), with auxiliary tanks.

New wing-mounted auxiliary tanks hold 120 gallons of fuel for an increased range of 12 per cent. Maximum recommended cruise is 215 mph at 66 per cent of power; top speed is 234 mph. Service ceiling is 23,300 feet; absolute ceiling, one-engine-out, 9,800 feet. With a gross weight of 8,750 pounds, the *Super 18* can climb to 25,700 feet. Among other features, this Beechcraft offers a 90,000 BTU interior heater, a new carburetor heating system, and a redesigned engine cowling for better cooling.

Other Beech offerings are the H-35 Bonanza, Travel Air 95 and the Morane-Saulnier "760 Paris."



MARK II LEARSTAR

Pac-Aero Engineering Corp.'s *Learstar Mark II* is a 12-place low-wing heavy twin with a retractable conventional landing gear. Powered by two Curtiss-Wright 1820-56-A engines of 1,350 hp, the *Mark II* is fitted with Hamilton-Standard 33D50-B, 3-blade propellers. Maximum cruise is 294 mph at 59 per cent power at 10,000 feet.

With 1,114 gallons of fuel, at 156 gph consumption, range is 1,880 miles, including a 45-minute reserve. At normal cruise of 275 mph at 55 per cent power at 10,000 feet, range is 2,800 miles. Service ceiling is 30,500 feet; one-engine-out absolute ceiling is 21,000 feet. Gross weight is 22,500 pounds; useful load, 6,500 pounds. Price of the *Learstar Mark II*: about \$180,000.

The *Mark II* is a more moderately priced version of the *Mark I*, which is a 300-mph plane powered by 1,425 Curtiss-Wright 1820-76-A engines. Cruising at 280 mph, the *Mark I* has a range of 3,300 miles.

LOCKHEED 329

Lockheed's latest, the 329, is a small, high-performance jet transport powered by two Wright TJ-37 turbo-jets or four General Electric J-85 turbojets. All engines are mounted aft on the fuselage, as on the Caravelle. Four J-85's give a cruise speed of 505 mph at 45,000 feet, and a range of 1,730 miles with a payload of 2,050 pounds.

The air-conditioned, pressurized cabin maintains 8,000-foot pressure at 45,000 feet. Fuselage-mounted engines reduce interior noise, isolate the airplane structure from exhaust-wake buffeting and vibration and simplify servicing and maintenance. All fuel storage and system components are outside cabin area. Integral tank extends full length of wing; auxiliary "slipper" tanks add 600 gallons and increase range to 2,130 miles.

Other interiors include the standard 10-passenger model, with crew of 2; the "Global," with a crew of 5 and 8 passengers, and the utility cargo version.



GRUMMAN 159

A pressurized turbo-prop corporate transport aircraft "designed specifically for modern businessmen" is being developed by Grumman Aircraft. The executive plane, designated *Design 159*, is powered by two Rolls-Royce "Dart" engines.

Twelve passengers will cruise at 375 mph maximum at 25,000 feet. *Design 159* marks Grumman's first entry into the commercial airplane market since 1950. Capable of operating from runways of less than 4,000 feet, 159 has a maximum range of 2,200 miles. Its design provides for modern electronic and communications equipment contained in a gross weight of 31,000 pounds, wing span of 78 feet and overall length of 64 feet. The transport will be certified under 4b category government airliner regulations and tested before initial delivery, scheduled for May.

Among the features of 159 is the location of a doorway and self-contained stairway aft of the cockpit.

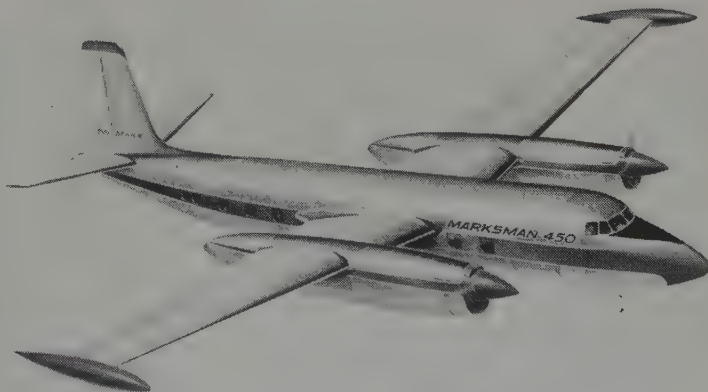


ON MARK 450

A twin-engine turbo-prop aircraft designed exclusively for the corporate market by On Mark Engineering, the *Marksman 450* is powered by two Allison 501-D21 engines rated at 3750-4000 ESH, and fitted with full feathering and reversible Aeroproducts propellers.

On Mark reports that the 450 will cruise at 425 mph at 30,000 feet with a payload of 29,000 pounds. Cabin pressurization will maintain a 5,000-foot altitude. At 20,000 feet, cabin altitude is sea-level. Fuel capacity of 2,100 gallons will give the 450 a range of 3,100 miles, bringing Europe and all of Latin America within non-stop range. The cabin will accommodate up to 14 passengers. Flight-testing of the *Marksman 450* will begin in mid-summer 1958 with production in 1959 on a two-per-month basis.

On Mark also produces an executive conversion of the B-26. Powered by P&W R2800-CB-16 engines, it has a 3,500-pound cargo capacity, top speed of 365.



620 CESSNA



The Cessna 620 is America's first airplane designed exclusively for executive transportation. A 7-9 place transport with retractable tricycle gear, the 620 is powered by four Continental GSO-526-A engines of 350 hp, with three-blade Hartzell full-feathering propellers.

Top speed is 282 mph; maximum cruise is 260 mph. The 620 has a gross weight of 15,000 pounds and a useful load of 5,000 pounds. Fuel capacity of 535 gallons gives a maximum range (optimum power at 15,000 feet) of 1,480 miles. Service ceiling is 25,000 feet; with one engine out, at 14,500 pounds, service ceiling is 20,000 feet. Standard equipment for the 620 includes five sleeperette seats and a folding table. Crew oxygen is standard. Optional equipment includes passenger oxygen, custom furniture, Collins integrated flight system, wing de-icing system, non-skid brakes, power steering, reversible props, and custom exterior paint. Production begins in 1958.

F27 FAIRCHILD



Designed to combine high performance with the flexibility of the DC-3, the Fairchild F-27 is the first turbo-prop aircraft tailored to short- and medium-range operations.

A high-wing monoplane with retractable tricycle landing gear, the F-27 is powered by two Rolls-Royce RDa6-1 Mark 511 engines, 1,720 eph, fitted with 12-foot Rotol full-feathering propellers. On 1,320 gallons of fuel, normal cruise of 272 mph takes the F-27 1,697 miles, with a 45-minute reserve. Range at maximum recommended cruise of 276 mph is 1,620 miles. Service ceiling is 32,000 feet. With one engine out, absolute ceiling is 17,000 feet. Takeoff run is 3,680 feet; sea-level rate of climb: 1,400 fpm.

Price of the executive F-27, \$590,000, includes extra fuel capacity for extended range, but without interior furnishings, on the theory that executive operators will prefer a completely custom interior.

VISCOUNT VICKERS



The Vickers Viscount is produced as a 48-passenger airliner or as a custom-styled executive aircraft. It is powered by four Rolls-Royce Dart R-Da-6 Mark 510 turboprop engines rated at 1,600 shp, with an additional 365 pounds of jet thrust available at take-off. Propellers are 4-blade Rotol full-feathering variable pitch. Landing gear is fully retractable tricycle type.

The Viscount has a maximum still-air range of 2,190 miles, and it can carry its maximum payload of 12,800 pounds for a still-air range of 1,450 miles. An extra long-range version of the Viscount Executive can fly 2,450 miles with a two-hour reserve. Fuel is carried in bag-tanks in the wings. Standard capacity of 2,310 U.S. gallons can be raised to 3,198 gallons with extra slipper and luggage-compartment tanks.

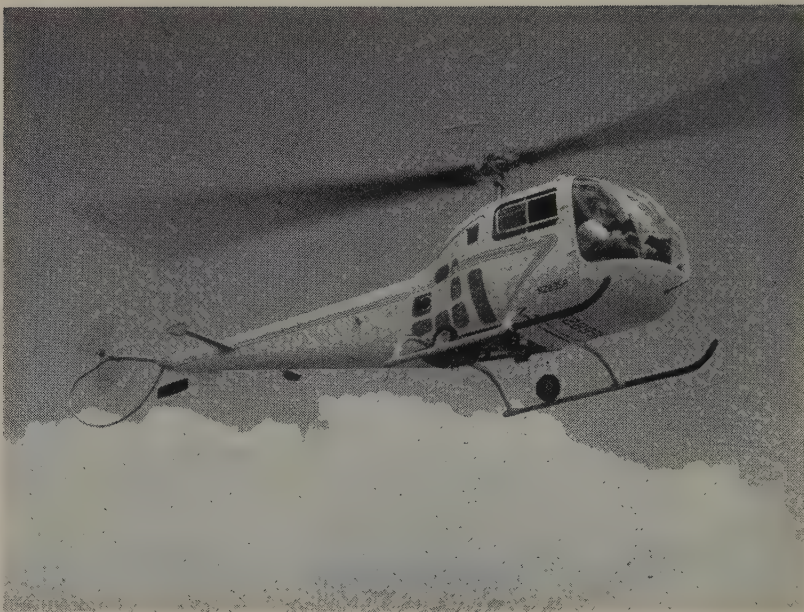
Present Viscounts have a cruising speed of 326 mph. A larger version, scheduled for 1958, will be powered by Dart R-Da-7 engines and have a cruising speed of 365 mph.

BELL 47J

The Bell 47-J *Ranger*, produced for the Navy as the HUL-1, is an extremely versatile 4-place helicopter which can be converted easily to executive transport, cargo carrier, ambulance for two litter patients, rescue plane or long-range survey helicopter.

Power plant is a Lycoming VO-435-A1A 260 hp engine, derated to 220 hp. Maximum speed is over 100 mph; cruise speed is about 90 mph. The *Ranger* has a useful load of 1,017 pounds; empty weight is 1,573 pounds. Cruise range is 220 miles. Arrangement of the interior, the result of an extensive survey, gives maximum privacy to passengers on the 60-inch seat at the rear of the cabin. When the *Ranger* is used for rescue work, the interior features a hoist which lifts objects through the floor directly into the cabin. The *Ranger* received CAA type certificate 2H-1 in 1956.

Flotation landing gear has been certified for the *Ranger*. Auxiliary fuel tanks are optional.



VERTOL 44

Improved version of the H-21 "Work Horse" military helicopter was introduced to the commercial market this Spring as a 15-19 passenger Vertol Model 44. Three versions are available: the 44A for utility passenger-cargo operations; 44B for passenger service; and 44C for deluxe executive transport.

Tandem rotor design allows placing cargo and seating passengers anywhere in the cabin. The seven-ton helicopter has a useful load of 5,345 pounds, with a cruising speed of 110 mph (maximum 140 SL) and a cruise range of 565 miles. Powerplant is rated at 1,425 hp SL takeoff, and 1,275 normal. Hovering ceiling is 5,300 feet (in ground effect); 4,000 feet, out of ground effect. Commercial models will be available with twin turbine engines, and superchargers for mountain operations. Also available for Vertol's 44 are special floats.

Vertol claims direct operating cost of 11½ cents per seat mile for the 15-passenger model.

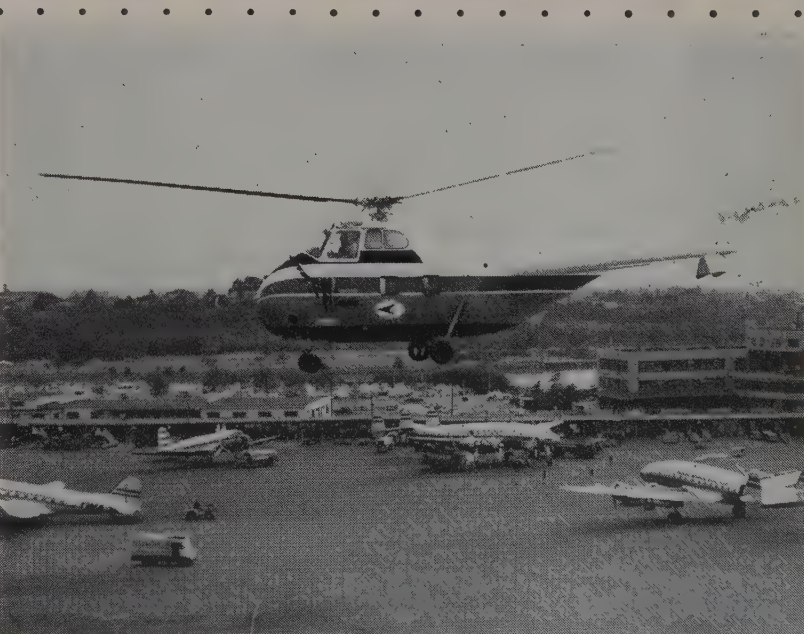


SIKORSKY S-55

Nose-mounted power plant, easily accessible for maintenance, is the novelty of the Sikorsky S-55, eight-passenger helicopter. Engine is a P&W Wasp, rated at 800 hp at takeoff.

Maximum speed is 115 mph, with cruise at 93 mph. Hovering ceiling is 8,600 feet (in ground effect); 5,200 feet, out of ground effect. Cruising range is 400 miles. Gross weight of the S-55A is 7,500 pounds, including a useful load of 2,455 pounds. Rate of climb is 990 fpm, maximum at sea level, and 280 fpm, vertical. Other dimensions are: fuselage, 42.2 feet by 5.7 feet; cabin, 5.2 feet wide by 6 feet high; overall height, 13.3 feet. Main rotor diameter is 53 feet. The S-55A carries a crew of two in a cockpit-over-engine. The power unit is so mounted that the drive shaft slopes up to the base of the rotor pylon clear of the main cabin.

The S-55 was originally built in 1949 and proved in performance by all the armed services.





SUPER VENTURA

HOWARD

A production conversion of the Lockheed PV-1 by Howard Aero, Inc., the *Super Ventura* is a 14-place mid-wing monoplane with retractable conventional landing gear. It is powered by two Pratt & Whitney R-2800-83AM10 engines of 2,400 hp, turning 4-blade Hamilton Standard propellers.

Current P&W CB-16 engines are available optionally. Maximum recommended cruise is 360 mph. At this speed, fuel consumption is 210 gph; a 1,340-gallon fuel capacity gives a range of 1,950 miles. At 310 mph, the *Super Ventura* consumes 170 gph for a range of 2,100 miles. Gross weight is 31,000 pounds; useful load is 12,000 pounds. Sea-level rate of climb is 2,500 fpm. Service ceiling is over 30,000 feet; one-engine-out ceiling, 10,000 feet. The basic airplane, with R-2800 engines but without interior or electronics, is priced at about \$296,000.

Among the options available on the *Super Ventura* are JATO solid propellant rockets for emergency or short-take-off power.

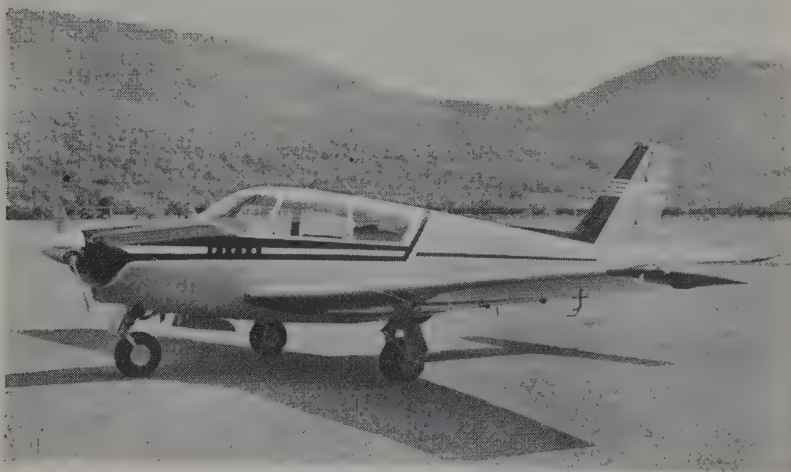


MARK 20 MOONEY

The Mooney *Mark 20* is a 4-place, all-metal low-wing aircraft with a retractable manual spring-loaded tricycle landing gear. Powered by a Lycoming O-320 engine of 150 hp, which turns a Hartzell constant speed propeller, the *Mark 20* has a maximum cruise speed of 165 mph at 4,900 feet, 75 per cent power.

Economy setting of 55 per cent power gives a speed of 150 mph at 10,000 feet. Range at optimum cruise is 750 miles. Maximum range is 900 miles. All-out top speed is 171 mph. Fuel capacity is 49 gallons. At sea level, the rate of climb is 900 fpm. Service ceiling is 17,200 feet; absolute ceiling is over 20,000 feet. Landing speed is 57 mph. Gross weight of 2,450 pounds includes 1,035 pounds of useful load. Reported price of the *Mark 20* is about \$13,000.

Company President Norman Hoffman reports that 20 acres of land have been acquired by Mooney Aircraft for expanded production of the *Mark 20*. The enlarged facilities will be located at Kerrville, Texas.



COMANCHE PIPER

Latest addition to the Piper business fleet is the *Comanche*. A 4-place all-metal high performance aircraft with a retractable tricycle landing gear, the *Comanche* is available in two models, the 180 and the 250.

The *Comanche 180* is powered by a 180-hp Lycoming O-360 engine fitted with a Hartzell full-feathering 2-blade propeller. Gross weight is 2,550 pounds; useful load, 1,100 pounds. Span is 35.8 feet, length 24.7 feet, height 7.3 feet. Price of the 180 has been tentatively set at about \$13,000.

The *Comanche 250* is a similar configuration, but is powered by a 250-260 hp Lycoming engine. It has a gross weight of 2,800 pounds, useful load of 1,200 pounds. Price of the 250 is reported to be about \$17,000.

Other aircraft in the Piper business fleet include the Cub, Super Cub, the Tri-Pacer, and the PA-18A, a crop-duster conversion of the Super Cub.

DOMAN LZ5-2

Designed and developed with the requirements of the corporate-commercial market in mind, the Doman LZ5-2 is an 8-place general purpose helicopter of conventional single-rotor type. Adaptable for passengers or cargo, the LZ5-2 has a range of 380 miles at a cruising speed of 105 mph.

The helicopter is powered by an 8-cylinder supercharged Lycoming SO-580-A1B engine of 400 hp, which is cooled by a Doman-developed exhaust ejector system. The main cabin is located directly under the aircraft's center of gravity; this permits a maximum variation of payloads with minimum effect on the helicopter's balance.

The LZ5-2 has a gross weight of 5,200 pounds, and can normally carry a payload of 1,813 pounds. Stripped of the covering on its 38-foot fuselage, it can carry up to 3,250 pounds. Accordion-type doors facilitate the loading of bulky cargo. As a passenger craft, the LZ5-2 carries six persons plus pilot and co-pilot.



COLONIAL SKIMMER

Designed for safe, stable, economical operation by businessman or sportsman, the C-1 Skimmer amphibian is powered by one Lycoming O-329-A2A engine of 150 hp, turning a 2-blade constant-speed Hartzell propeller.

A 3-place plane with jump-seat room for two children, the Skimmer will travel a maximum of 566 miles (with a 45-minute reserve) at normal cruise speed of 115 mph. Maximum recommended cruise of 122 mph reduces range to 513 miles. Low stall speed (50 mph) makes the Skimmer safe and flexible.

Gross weight is 2,150 pounds, of which 725 pounds is useful load. Fuel capacity is 40 gallons. Service ceiling is 14,000 feet. Safety features pointed out by the manufacturer: 80 per cent of wingspan is slotted flaps for optimum climb and glide control; all metal construction; wide-base retractable tricycle gear for improved ground handling; engine mount stressed for a load of 20G; 5-compartment hull.

Price is about \$16,000.



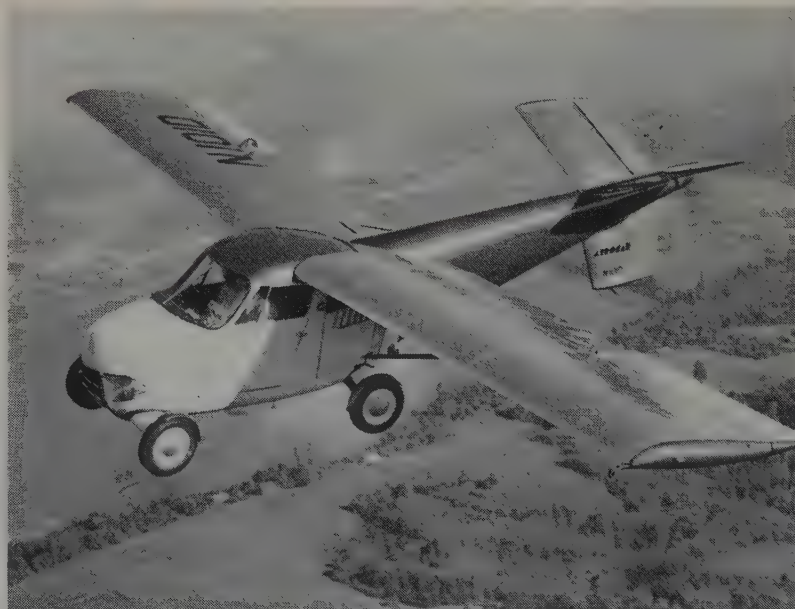
AEROCAR

First completely roadable aircraft ever to receive CAA certification, Aerocar, "the flying automobile," converts from plane to car in four minutes without the need for special tools or extra equipment.

Driven by a single Model O-320 143-hp Lycoming engine, it cruises at a speed of 100 mph, with a maximum speed of over 110 mph and a cruising range exceeding 300 miles. The craft comes with built-in wheels, which retract into the wing leading edge during flight. After flight, the wings and tail fold into a compact unit which may be towed by the car as a 15-foot trailer.

Aerocar measures 21 feet, 6 inches long and has a wing span of 34 feet; the car is 10 feet, 4 inches long. With a gross flying weight of 1,900 pounds, Aerocar carries a useful load of 550 pounds and baggage weight of 60 pounds.

At present, the production of Aerocars is limited to demonstration aircraft, and orders are taken on a custom basis from selected buyers.



Research Behind Aviation Fuels And Oil

by Leonard M. Fanning

Author of "The Rise of American Oil."

In the early days of aviation, airplanes had to take pot luck with automobiles in so far as their fuel and lubrication was concerned. It wasn't until World War I that the U.S. Army became seriously interested and intensive research began in cooperation with the oil industry and airplane engine manufacturers. In 1918 the military services set up specifications for a suitable aviation gasoline that definitely differentiated it from motor fuel.

During the war, also, for the first time petroleum lubricants were developed for airplane engines and began to supplant castor oil.

At the flying fields in America, after the United States had entered the war in 1917, few flying oils were alike. Most were castor oil combined with mineral oil. Some were too light, and were consumed too quickly. Some were too heavy, and caused piston seizing. No engine was expected to operate more than ten hours without a "top overhaul"—grinding valves, carbon removal and the like. Castor oil was scarcely a satisfactory engine lubricant but it was the best available.

The Government was launching its program for building Liberty aero engines on a mass production basis. It must have oil to lubricate the machines. Castor oil, which had hitherto only enjoyed a doubtful fame of being the most-hated medicine of helpless childhood, suddenly commanded a premium in industry. The War Department sponsored a drive for intensive cultivation of the castor bean.

As industry, coupled with science, started the perfecting of practical flying machines, so it did in the matter of lubricating oils. Aviation engineers made tests of planes in "wind tunnels," and petroleum engineers made tests of petroleum lubricating oils under operating conditions. These tests were unified under Government military departments. In oil company and Government laboratories, engines were run at full power, each using a different oil, and data was compiled on the delivered brake-horsepower, bearing temperature, fuel consumption. Engines were examined after each run, and were photographed to note wear and cleanliness.

Selection and processing of the oils at refineries underwent necessary changes. In a few months, specifications were written covering all oils that gave best performance. All refineries equipped to do so supplied these oils, which were exclusively petroleum oils. When Liberty engines were ready to be shipped overseas in April, 1918, there were petroleum lubricating oils that would serve their needs. Patriotic castor-bean growers were told to desist.

With Liberty aero oils, airplanes

could be flown longer without overhaul. The safety factor was tremendously increased. There was no wearing out of the oil, and reclamation and re-use were possible. Moreover, assured of oils that would meet such specifications, engine manufacturers could standardize shop practices in producing the engines.

The American Petroleum Institute was organized after the war and immediately inaugurated the cooperative program with the U.S. Bureau of Mines and automobile manufacturers which has played so important a part in synchronizing and harmonizing technical development of the respective industries to the benefit of the users. Much of this research had to do with recognition of antiknock value and the development of suitable rating methods to determine it.

The important researches that grew out of the war continued unabated. The Army Air Corps in 1928 studied the possibility of developing substantially increased power without increasing the size of the aviation engine. How? If only a standardized fuel of high anti-knock value could be made and supplied! Oil technologists and refiners were called in. Specifications were drawn up. Refiners went to work and, by selection of crude oil, by cracking and the use of tetraethyl lead, supplied the Air Corps' demands. They made an anti-knock gasoline of about 87 octane number. With it the engine developed a third more horsepower per cubic inch of displacement than it formerly could. This meant increased power, improved flying speed, take-off and climb. This fuel made outstanding the performance of United States military planes.

Refiners extended their program to make high-octane gasoline available to commercial fliers. Within a few years, a standardized anti-knock quality fuel was sold in classifications ranging from 73 to 87 octane number.

Spurred to even greater results in this direction, refiners developed for the United States Army Air Corps in 1934 a fuel of 100 octane number. The engine's size remained the same, but its power output was increased 15 to 30 per cent. This fuel was used in all service tests and soon was to be used by all military planes, with commercial airlines to be supplied in due course.

When the Second World War started, American oil companies began to work frantically to bridge the gap between small-scale production of 100-octane gasoline and manufacture on a large-scale basis through the catalytic cracking and other processes. The fundamentals of making 100-octane were estab-

lished: First, use of the best base stock a refinery could produce; then, the addition of about an equal volume of some complex blending agent, such as iso-octane; and, finally, the addition of tetra-ethyl lead. The question was how to develop means of manufacturing each component on a large scale.

Simultaneously several new and ingenious sources of blending agents were perfected. The first was the synthesis of iso-octane from isobutylene and normal butylene. Much more important from the standpoint of volume was the use of alkylate as a blending agent to supplement iso-octane. Alkylate was made by combining butylenes, which are by-products of the thermal and catalytic cracker, with isobutane. Still other blending agents that were used included: cumene, a product manufactured from benzol and petroleum gases, credited with increasing 100-octane production 22.8 per cent; toluene, the same liquid that forms the basic ingredient for TNT; and hydrocodimer, another liquid petroleum product.

The supply of base stock could be increased by the production of a synthetic stock of hydrogenation, which, ironically enough, was based on a German process, discovered during the First World War, of making gasoline out of coal. It served the United States well in the Second World War. But it remained for catalytic cracking to develop into the greatest single source for base stock.

Production of 100-octane gasoline had been achieved only in small peacetime commercial quantities before the Second World War. In 1940 the war turned sharply in our direction. Denmark, Norway, the Low Countries, and France collapsed with frightening rapidity. The arming of our air forces and army and a two-ocean navy became a race against the clock. By the time the indomitable flyers of the RAF went up in their Spitfires against the attacking Luftwaffe in the Battle of Britain, American 100-octane aviation gasoline could help them save the day. After Pearl Harbor and our inauguration of a great plane production program, the need was for 100-octane gasoline in unbelievable quantity.

One of the bottlenecks to large-scale production, however, was the inherent catalyst operation. The catalyst was a claylike solid which had to be brought into contact with the vaporized oil during the cracking reaction. It could be used almost indefinitely, but the cracking reaction coated its surface with coke and thus made it inactive. Periodically its surface had to be cleaned, and this process was a time-killer and

(Continued on page 73)

51X-2 VHF Communication Receiver

The 51X-2 provides 880 crystal controlled channels with 50 kc spacing between 108.0 and 151.95 mc. Modularized construction. Also provides maximum VOR and Localizer instrumentation when used with the 344B-1 instrumentation unit. Cased in short $\frac{3}{8}$ ATR weighing ten pounds. Optional power requirements are 2 watts at 27.5V DC, and 25 watts at 115V AC 400 cps or 27.5V DC. Self-contained power supply.

51Z-2 Marker Beacon Receiver

The 51Z-2 provides aural and visual indication of passage over a 75 mc marker beacon. Crystal controlled with transistor switches. Available in either single of three lamp configuration. HI-LO sensitivity controlled remotely. Modularized, contains only five tubes. Optional power supplies. $\frac{1}{4}$ short ATR. Weight: 3 lamp unit, 4.5 lbs.; 1 lamp unit, 3.8 lbs. Power (excl. lamp drain): approximately 15 watts (three lamp unit) — 115V AC or 27.5 DC.

51Y-1/51Y-2 ADF Receiver

These receivers provide automatic or manual DF, AM, CW or range reception. Continuous electrical tuning from 90 to 1800 kc utilizing a digital indicator. Only 11 tubes. Sharp and broad bandwidth selector. Receiver weight 17 lbs. 51Y-1 $\frac{1}{2}$ ATR; 51Y-2 $\frac{3}{4}$ short ATR. Power requirements are 15W at 27.5V DC and 35W at 115V 400 cps, in addition to 32W at 115V 400 cps, or 27.5V DC. Two integral power supplies available. Sealed or unsealed loops.

17L-7 VHF Communication Transmitter

The 17L-7 is a companion unit to the 51X-2. It provides 680 crystal controlled channels with 50 kc spacing. Frequency range 118.0 to 151.95 mc. Employs only 38 crystals. Maximum frequency change time, four seconds. Power output 25 watts. Weight: 14 pounds including integral power supply. Power requirement: 180W max. 27.5 DC-AC supply also available. Short $\frac{3}{8}$ ATR case.

17L-8 VHF Communication Transmitter

The 17L-8 is a 3 watt VHF transmitter in a 3" diameter case 8-11/16" long for mounting on instrument panel. 90 consecutive 100 kc channels from 118.0 to 126.9 mc — crystal-controlled and weighs only five pounds including modulator-power supply which is separate unit — 7 x 3-15/16 x 3-9/16 — may be mounted anywhere. Transistorized modulator for 90% modulation with carbon mike. For 27.5V DC. Companion receiver available soon.

51V-3 Glideslope Receiver

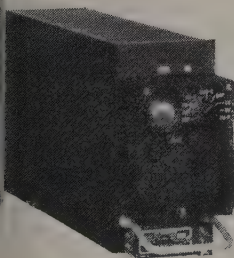
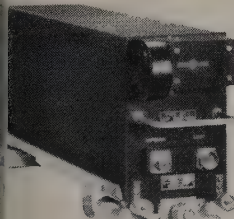
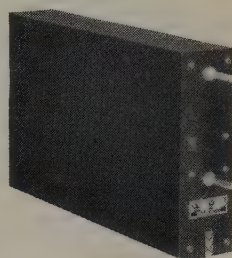
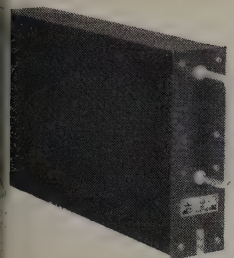
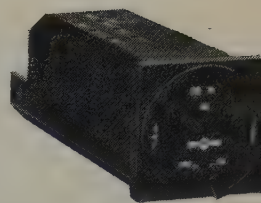
The 51V-3 provides 20 crystal controlled channels between 329.3 and 335.0 mc incorporating motor driven crystal switches for high reliability. With Collins 51R Navigation Receiver fulfills all ILS glideslope and localizer requirements. Includes power supply for which there are three optional arrangements with average demand at 25 VA or less; approximately 25 watts DC additional required during channel change. Weighs 6.4 pounds, short $\frac{1}{4}$ ATR case.

FD-104 Integrated Flight System

Collins has been active in Integrated Flight System development since 1948. Production versions of the IFS are in use in many aircraft types and in scheduled airline service. The Integrated Flight System presents basic attitude, navigation situation and steering information to the pilot. Two instruments provide a "forward view" presentation, on the Approach Horizon, and a "plan view" on the Course Indicator. Both displays are of the pictorial type, combining the available data in an unambiguous manner.

New circuit designs employ reliable magnetic amplifiers and transistors — no vacuum tubes are required. Power consumption and equipment temperature rise are reduced. Modularized throughout.

The latest Flight Director System incorporates easy-to-read 3" panel instruments and a $\frac{1}{2}$ short ATR case for the steering computer. Weight 30.6 pounds. Power requirement: 100 VA start, 50 VA run (115 400 cps 1 ϕ plus 28V DC).



Collins

CREATIVE LEADER IN AVIATION ELECTRONICS



See your Collins authorized dealer or distributor. Many new ones are now being appointed.



A DC-3 MODIFICATION job that no one else would tackle for J. C. Garrett was the first step in his turning a six-man maintenance crew into what is now the AiResearch Division. Today 300 persons working in three hangars service all types of aircraft and offer such engineering services as aircraft stress analysis, structure design, weight analysis, interior styling and design, power-plant modifications, acoustics research and furniture and equipment design.

Its Maximizer Kit will step a DC-3 up 20 m.p.h. without a horsepower increase, or give the equivalent in economy operation. When Los Angeles Airways added passenger service, AiResearch converted the interiors of their S-55 Sikorsky helicopter fleet. A year ago, on its 10th anniversary, the division moved into a \$600,000 layout at L.A. International Airport. It includes a hangar with four bays, each big enough for a four-engine airliner, and administration building. Behind them is a stripping and wash rack. The facility is the only CAA-approved repair and overhaul base for private planes at L.A. International.

The Company has put executive interiors into aircraft for such customers as Douglas Aircraft, Jacqueline Cochran, General Electric, Sears Roebuck, USAF, Continental Oil and Texaco.

FIXED BASE

The Backbone

Every structure must have its strength members. In *Homo Sapiens*, the backbone comprises the structural blocks that insure strength, coordination and agility. Through the backbone flow the nerves which branch to all parts of the body.

Civil Aviation also has a backbone; a strengthening coordinate to which all of Civil Aviation is sensitive and upon which it is very dependent.

Fixed Base operators are the structural blocks that make up the backbone of Civil Aviation. Through these operators are obtainable the myriad parts, accessories, materials and supplies used by aircraft owners. Tools, know-how and experienced and skilled workmen stand ready to serve an industry. Fuel, lubricants and wash jobs are uncomplicated but essential services which Fixed Base Operators supply. Complicated electronic and radio installations, engine overhauls, periodic inspections, sheet metal work, hydraulics, even extensive modifications, involve much more technical capabilities.

L. B. SMITH AIRCRAFT CORP.—Miami, Fla.



ALL HANDS at L. B. Smith are deftly trained and thoroughly experienced, and available in force to supply corporate aircraft needs, from an engine check to a major conversion. Pictured is a recent example of their work, the "Tropicana" DC-3. Smith boasts extensive, all-inclusive engineering facilities, expert wiring, hand-made cabinet work, hand-fashioned non-standard parts, expert instrumentation, all phases of engine maintenance and paint jobs.

Following the rule "Do it best!", Smith's technicians have built for the Company a reputation for specialized know-how and a strong sense of responsibility and integrity which has drawn business from all parts of the country. Teamwork at Smith has resulted in a successful facility operation, including aircraft sales, financing and leasing; specializing in C-46, C-54, DC-3 and Lodestar aircraft and parts. Smith is the Aero Commander distributor for Florida, Alabama, Georgia, Cuba and the Bahamas. An extensive engineering staff provides service on planning and designing of aircraft conversion, as well as installation of custom interiors.

Instrument repair and sales are handled by L. B. Smith's Aerosmith division, also located at Miami's International Airport.

EXECUTIVE AIRCRAFT SERVICE, INC. Dallas, Texas

Organized in 1945, Executive Aircraft specializes in the overhaul, modification, maintenance and modernization of business aircraft fleets—particularly DC-3s and Lockheed Lodestars.

The facilities at Garland airport consist of 50,000 square feet of hangar and shop working area. An electronics division for installation of radar, radio and other navigation equipment was opened in 1955. Installations on executive planes include the latest in engineering developments such as picture windows, birdproof windshields, short exhaust stacks, geared rubber tabs and wheel doors. The firm is currently working on a Lodestar with an enlarged cockpit that is expected to be a unique design in the field.

Eighteen per cent of the employees have been with the company over 10 years; 32 per cent from 5 to 10 years. Lewis V. Emery is president; Kenneth S. Schumacher, vice-president and general manager.

TIMMINS AVIATION LIMITED Montreal, Quebec

Beech Aircraft and Dallas Airmotive Limited have appointed TAL as their distributors in Canada. Recent work at the TAL hangars at Montreal airport includes an 8,000-hour overhaul and executive interior conversion on the Goodyear DC-3 and rebuilding and overhaul of the Miron and Freres Ltee., Canso.

OPERATIONS

of Civil Aviation

These are only a few of the things the Fixed Base Operator stands ready to do for Civil Aircraft owners. His investment is often very considerable; his overhead is *fixed* and often high, yet he is without assurance from month to month as to just how much business he may do. And when he has a job to do, more often than otherwise it is a job that the owner of the aircraft wants finished *day before yesterday*.

Failure to have sufficient lead time notice causes him many headaches and offsets his ability to *plan* the job, to order parts and supplies ahead, to schedule his work efficiently.

Despite these handicaps, he services 60,000 airplanes and produces an enviable record in service and in safety.

The vital strength, coordination and agility of the great American fleet of Civil Airplanes, are in no small part due to the backbone on which we all depend—The Fixed Base Operator. He not only deserves our praise, he deserves our continued good will and our increasing patronage.



PART OF ITS \$4 MILLION construction program, SAC's \$250,000 Love Field terminal is scheduled to open in October. Features of the building are frosted walnut paneling, air conditioning, terrazzo floors, recessed lighting and a private room for flying executives to confer and give radio, TV and newspaper interviews. Elsewhere on the 35-acre site, which is leased from the city of Dallas, four extra hangars are abuilding and slated for occupancy early next year. Completion of the program is expected in early summer of 1958.

A six-man operation when founded in 1932, the company now employs 800 and last year opened branches in Denver and Kansas City, Kan. Of the \$12 million gross sales anticipated during the next fiscal year, business aviation is expected to maintain its dollar-volume edge. As the only commercial jet engine overhaul facility, under contract with the armed forces, SAC is prepared for jet power in business flying. Meantime, the engine overhaul plant continues to rework piston power for business aircraft and supply Beech Aircraft with the R-985 Wasp Juniors used on its new-production planes.

Novel aspect of SAC's busy construction program is the *Plane-O-Tel*, an airplane storage hangar, 400 by 80 feet, reminiscent of the highway motel.

HOWARD AERO, INC.

San Antonio, Texas

Besides manufacturing the *Super Ventura*, Howard Aero offers complete executive services as well as conversion on all types of conventional aircraft and helicopters. Since the delivery of its first *Super Ventura* to Copano Oil Co. of Victoria, Tex., in May 1956, 22 of the planes have been sold to such companies as Ohio Oil, Gulf, Standard of Indiana, National Steel and Firestone.

President D. U. Howard believes that \$5,286,000 in 1956 sales makes the company the world's largest in dollar volume devoted exclusively to executive aircraft. Firm commitments for the *Ventura* in 1957 total \$4,575,000.

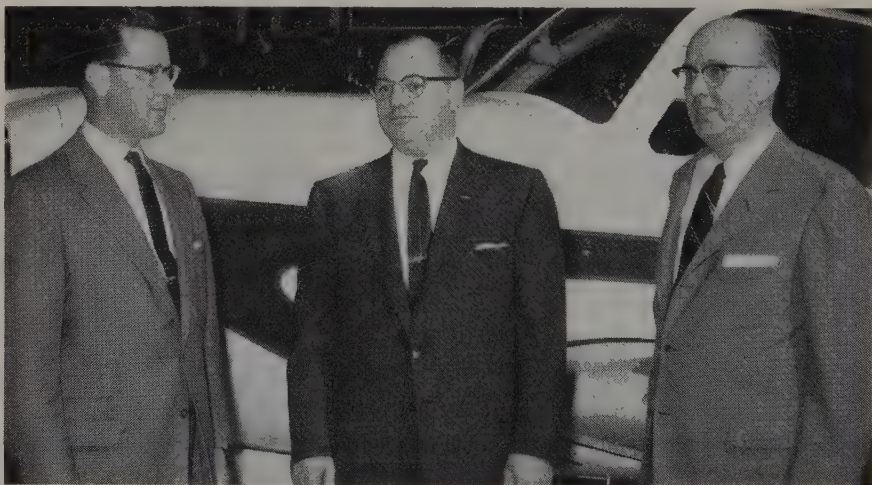
Now employing 600 persons, Howard Aero began in March 1947 with one employee. Factory, shop and hangar space has since grown to 100,000 square feet; offices to 10,000, and warehouse to 15,000 at International Airport.

STEWART-DAVIS, INC.

Gardena, Calif.

Incorporated in 1946, Stewart-Davis began supplying commercial overhauls to business aircraft three years later. In 1950, S-D made the first commercial installation of the R-1830-94 Pratt & Whitney. Six years later the company developed a jet-powered auxiliary power package for civilian use. Installed on a Fairchild C-82, its prototype, the JET-PAK 3200, was successfully tested Feb. 10, 1957.

ATLANTIC AVIATION CORP.—Wilmington, Del.

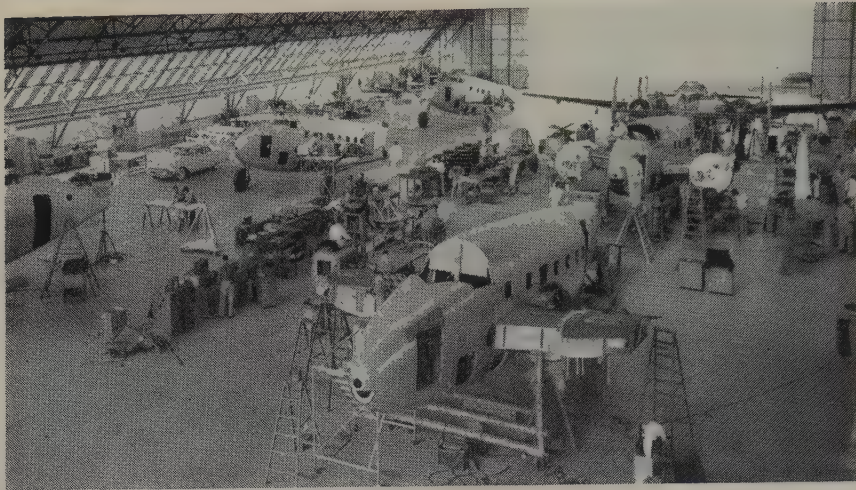


THIRTY YEARS have found Atlantic Aviation, world's largest Beechcraft distributor, mushrooming from a small sod airport and wooden hangar to a \$7½ million volume-system of fixed base operations serving the east coast from Maine to Virginia. Atlantic's major facilities for business aviation, handling everything from Cubs to DC-3's, are located at Teterboro, Philadelphia International and New Castle County (Del.) airports. Additional, complete facilities on a smaller scale are located at Boston, Lynchburg, Va., and duPont Airport. Traffic through these bases last year was estimated at 125,000 aircraft.

Self-styled "the east's complete business aviation service," Atlantic also handles Piper sales and offers consultant services. With five inventories to draw from, Atlantic represents one of the largest dealer-distributorships in the industry for aircraft and associated parts and supplies. Atlantic's major growth occurred in the last ten years, when the Company added and consolidated its facilities under single management at New Castle County Airport.

Top-management guiding the Company is Stewart E. Poole, president; Stewart M. Ayton, vice-president; and W. E. Richards, vice-president (see photo, right to left).

PACIFIC AIRMOTIVE CORPORATION—Burbank, Calif.

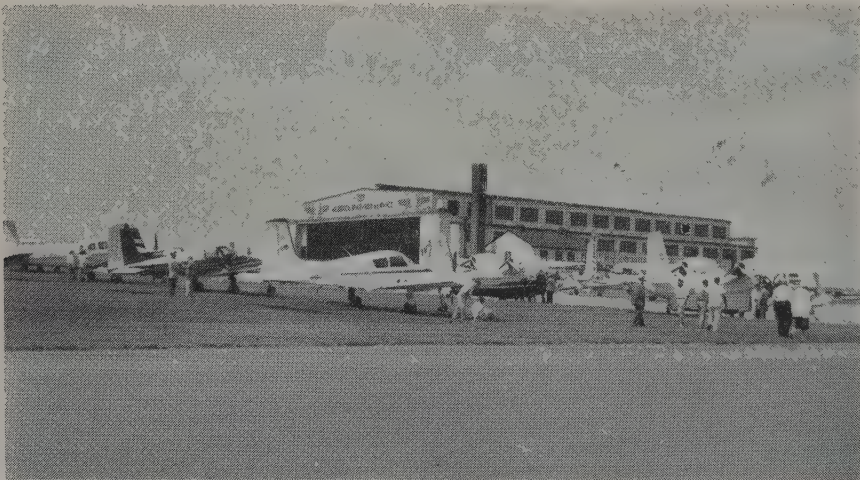


FOUNDED IN 1928, PAC is the oldest and largest privately-owned aircraft maintenance company in the U.S. Base of operation for more than 100 private and business aircraft, Burbank's "One-Stop Service" offers modification, maintenance and overhaul of aircraft, including airframes, engines, accessories and propellers. Last year, various C-47 parts, none from the same plane, were assembled in 4½ months into an executive DC-3.

PAC's authorized dealers throughout the West supplement its Aviation Products Division branches in Burbank, Oakland, Seattle, Denver and Kansas City, Kan., and are ready with replacement parts in emergencies. This division provides complete instrument overhaul at Oakland and accessory and component overhaul in Seattle. Net profit for the first six-months period of 1957 was \$443,548, more than a 20 percent increase over the corresponding 1956 period, according to unaudited figures released by John W. Myers, president.

Biggest recent move in PAC's build-up was its acquisition of Lear Aircraft Engineering Division, renamed PacAero Engineering Corp. The new subsidiary added 32 engineers to PAC's roster. Service facilities of PAC have gained such a reputation for performance that corporate aircraft come from as far away as Pittsburgh and New York, year after year.

READING AVIATION SERVICE—Reading, Pa.



DURING HALF of its 16 years, Reading Aviation Service has conducted an annual maintenance and operations meeting regarded as one of the largest and most informative gatherings in the country for aircraft owners and pilots. The one-day session consists of a series of lectures on safety, operations and maintenance techniques and developments, demonstrations and exhibits of the latest aviation equipment, and a contest for the Reading Aviation aircraft awards.

Aircraft ranging from light, single-engine planes to DC-3s are judged in each class on four points: appearance—exterior and interior—arrangement of equipment for satisfactory operation, and the best all-around aircraft. This year's meeting also featured an "antique" plane contest with awards for the oldest, best-restored and flyable planes.

As pioneers in the installation of airborne radio, radar and automatic flight equipment, RAS has to date installed 25 radar systems and 75 automatic pilots in executive aircraft. Although maintenance of executive aircraft is the Company's major activity, it also conducts a primary and instrument pilot training school in its hangars at the municipal airport.

In the Business Hangar . . .

■ **EXECUTIVE AIRCRAFT SERVICE, INC.** Pilot Ed Armstrong had the DC-3 belonging to S. W. Richardson of Fort Worth in to Executive Aircraft Service, Inc. for 100-hour and periodic inspection, recovering of flight control surfaces, overhauling landing gear and miscellaneous repairs. □ The Douglas B-23 owned by International Petroleum Corp. of Lima, Peru, has left Executive Aircraft Service, Inc. following completion of 1000-hour overhaul and relicense, installation of anti-icer system, 200 amp generator system, firewall shut-off valves, Winslow Aerofilter, new instrument and electrical switch panels and Radome, and repainting of the exterior. W. M. Corry is the pilot and W. C. Bowman is maintenance chief. □ Executive Aircraft Service, Inc. has completed 100-hour inspection, relicense and miscellaneous repairs on Air Associates, Inc. of Dallas, Cessna 180 and on the DC-3 of The Dow Chemical Co., Freeport, Texas, whose pilot is Ted Merchant. □ Chief Pilot Russell Purchase had the DC-3 of Dow Chemical Co., Midland, Mich., in to Executive Aircraft Service, Inc. for major overhaul, engine change, modification of oil tanks and lines, and installation of short exhaust stacks, Edison fire detectors, new electrical wiring system, 200 amp generator system, Collins auto-pilot, Bendix radio and radar, Pan American landing gear doors, aileron gap closure and wing fillet kit, Airstair entrance door, large baggage door and new interior. □ 100-hour inspection and miscellaneous repairs have been completed by Executive Aircraft Service, Inc. on the Lockheed Lodestar operated by Gulf Oil Corporation, Fort Worth. Chief Pilot is Stein Lee. □ Left engine change and miscellaneous repairs were made by Executive Aircraft Service Inc. on the E. W. Brown, Jr., DC-3 from Orange, Texas. Pilots are R. F. (Wimpy) Neel and Ben Duhon. □ F. L. (Doc) Copeland, pilot, and Paul Spender, mechanic, had the Houston-based Lockheed Lodestar of P. R. Rutherford in to Executive Aircraft Service, Inc. for miscellaneous repairs.

□ Tennessee Eastman's DC-3 was brought to Executive Aircraft Service, Inc., recently by pilots Leo Boyd and Ralph Bailey. A periodic inspection, installation of new carpet and headlining, and miscellaneous repairs were performed. □ Miscellaneous repairs were done on Union Chemical and Material's DC-3—Charlie Bolton, pilot. □ Both of S. W. Richardson's DC-3's were brought to Fort Worth to Exec. for repairs and periodic inspections, by pilots Ed Armstrong and Jim Smith. □ **Delhi-Taylor Oil Corp.** has its Dallas-based DC-3 in for sundry repairs. Don Beeler is chief pilot.

■ **The Norman Larson Co.'s PlaneService**, Van Nuys, has just completed speed cowl modification on Gene Autry's D-18 Beechcraft piloted by Herb Green. □ Dr. John F. Roberts brought his Bonanza in for T-3 Tactair Auto Pilot installation. 100-hour inspection was ordered by Pilot Bill Deese for Southern Tank Lines Bonanza. □ Dr. Bartlett C. Shackford flew in with his Bonanza for a T-3 Tactair Auto Pilot installation.

Featherweight Champ!

ARC's ADF weighs less than 20 lbs!

Why carry dead weight? Why excess bulk?

This Automatic Direction Finder offers accuracy and reliability proved in more than two years of testing — yet the entire 5-unit system weighs only 19.7 pounds. Now you can have a DUAL installation where required — at a weight saving of 80 pounds or more.

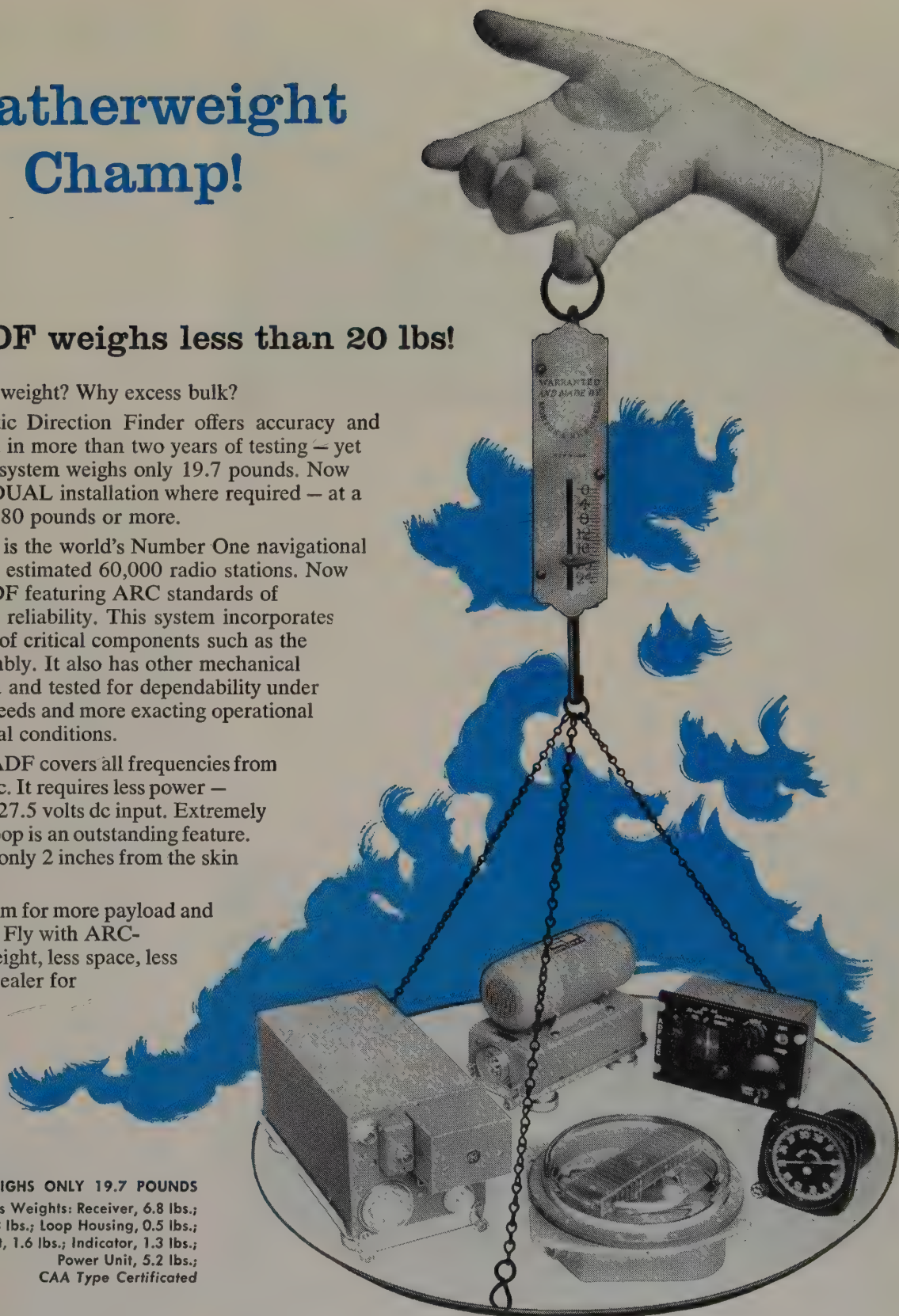
The ADF still is the world's Number One navigational aid, usable on an estimated 60,000 radio stations. Now you can have ADF featuring ARC standards of performance and reliability. This system incorporates hermetic sealing of critical components such as the entire loop assembly. It also has other mechanical features designed and tested for dependability under today's higher speeds and more exacting operational and environmental conditions.

The Type 21 ADF covers all frequencies from 190 kc to 1750 kc. It requires less power — only 2.8 amps at 27.5 volts dc input. Extremely low drag of the loop is an outstanding feature. Housing extends only 2 inches from the skin of the aircraft.

Now make room for more payload and other equipment. Fly with ARC-reliability, less weight, less space, less drag. Ask your dealer for complete details.

TYPE 21 ADF WEIGHS ONLY 19.7 POUNDS

Component Units Weights: Receiver, 6.8 lbs.;
Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.;
Control Unit, 1.6 lbs.; Indicator, 1.3 lbs.;
Power Unit, 5.2 lbs.;
CAA Type Certificated



Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, NEW JERSEY

Omni/ILS Receivers • Course Directors • UHF and VHF Receivers and Transmitters
LF Receivers and Loop Direction Finders • 10-Channel Isolation Amplifiers • 8-Watt
Audio Amplifiers • Interphone Amplifiers • Omirange Signal Generators and Standard
Course Checkers • 900-2100 Mc Signal Generators

EMBRY-RIDDLE AERO. INST. Miami, Fla.



LOCATED WHERE contact flying is the rule 97 per cent of the time, Embry-Riddle operates one of the largest private flying training centers in the country. Based at Tamiami Airport, just west of Miami, training is conducted with 35 single and multi-engine aircraft of all types.

Major course offered is "Business Pilot," taught in conjunction with the U. of Miami. The course is designed to offer the best possible background in minimum time in a wide range of technical aviation subjects. No private pilot training is offered, since E-B's courses are designed "to enable the student to become gainfully employed in his chosen field immediately after completion of the course."

The two-year Business Pilot course provides training for commercial pilot tickets and instrument and multi-engine ratings. Graduates are qualified as pilots of corporate aircraft and/or the general fields of commercial flying and aviation management. University credits apply toward the BBA degree.

Also offered is a four-year course in Aviation Administration, in conjunction with the U. of Miami. E-B provides the flight and ground school training courses.

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NEWARK AIR SERVICE, INC. Newark, N.J.



FULL RANGE of aircraft services and conveniences for both crew and passengers is offered by Newark Air Service, who style their operation as "Southern Hospitality in North-
ern New Jersey."

Located at the 2,300-acre Newark Airport, NAS offers an unlimited Class 3 and limited Class 4 CAA repair station facility whose services include welding, sheet metal, electrical and paint shops, as well as inspection.

A 43,000-sq. ft. hangar can store aircraft up to DC-6's. For on-the-go executives, NAS provides a conference room, lounge, weather reports, limousine arrangements, telephone and catering services.

A wholly-owned subsidiary of Lehigh Warehouse & Transportation Co., NAS offers day and night service, only 20 minutes by car from New York City proper. Newark Airport, a pilot's airport, offers a minimum of delay in circling and landing. One of the finest all-weather airports in the U.S., it is equipped with a new 7,000-foot runway and the most advanced bi-directional instrument landing system and approach light equipment available at any commercial airport.

In the Business Hangar . . .

■ **Horton and Horton**, Fort Worth, Tex., Ferrell Roberts, Tulsa, Aviation head of Pan American Petroleum (formerly Stanolind) chose cleanable white vinyl "damask" headlining, beige "bark" vinyl sidewalls, for their third H & H Douglas A-26 interior. □ Bill McDavid, Houston, has another Aero Commander 520 now sparkling new with an H & H "Gold Crest" interior using white nylon, red top-grain leather, gold swirl vinyl sidewalls. □ Joel Harper, Dallas securities dealer, chose turquoise for his second "World's Most Beautiful Howard" by H & H; also sports red and black tweed in his Swift, and will return again next month with his Douglas A-26 for a complete custom interior. □ Joe Hamlin, pilot for Marshall Young brought his third D-18 to Horton & Horton, this time sea-foam green and beige is the color scheme. □ Another H & H service; interior shampooing; renewed two 1956 H & H interiors. Luke Allen, pilot for V. F. Neuhaus brought his D-18 and John Loftin flew in the Western Co., Dove. Both ordered monogrammed headrest covers, napkins. □ Sam Jennings, Western Cottonoil, Abilene returned to H & H, this time for carpet protectors, monogrammed napkins, cards, and matches for his Super E-18. □ Don McDonald, chief pilot, Burrough's Corporation, Detroit, visited H & H; had grills installed in his DeHavilland Dove doors, ordered monogrammed maslin towels, and napkins for his 1956 Horton & Horton interior. □ Repeat customer Johnny Hamp brought Mr. J. W. Allison's Grumman Goose from Houston for complete Horton treatment prior to an Alaska flight.

■ **American Airmotive's** president Charles E. Lewis, has broken ground for a \$2-million full-cantilever hangar to be completed this year. □ First installation in an exec aircraft of a Collins DF-201 ADF was made by Amairco on H. S. Vanderbilt's Learstar—Bill Faulds, pilot. A custom radio panel modification was made to incorporate the DF-201 control head. □ Nat'l. Dairy Products Corp.'s DC-3 sports a new exterior paint job and newly-recovered control surfaces, done by Amairco. Pilot Rip Strong and co-pilot Pete Hellebrant supervised this work. □ The Cappel-MacDonald Co.'s Lodestar has just had a 100-hr. inspection, plus an engine change and installation of a 618-S Collins HF transceiver. Chief pilot Jack de Wolfe and pilot Jim Hondorf supervised the work. □ Trans-Caribbean Airways' DC-4 is in Amairco's hangar, in final stages of a 10,000-hr. overhaul, complete with engine change, cabin interior rejuvenation, new exterior paint job and installation of a 618-S Collins HF transceiver. Charles Sudarno is supervising.

■ **Howard Aero Mfg. Div.**, San Antonio, has sold its 22nd Super Ventura to Cluett Peabody, Inc., New York; Super-V, scheduled for delivery in Jan., will cruise at 300 mph, have 2000 mi. range, will be fully equipped with Sperry A-12 auto pilot, Collins Comm. and nav. equipment, Bendix ADF, P&W R-2800 Am-10 engines, Sperry C-4 compass system, Narco DME, Bendix Radar and Transvaal HF Radio. Howard Aero will gross \$8 million in sales this year.

In the Business Hangar

■ **Remmert-Werner, Inc.** Skip Wittner brought Kewanee Oil Company's DC-3 to Remmert-Werner Inc. in St. Louis for an aileron change. □ Gardner Denver E18 Beech had an engine change and 100-hour inspection at Remmert-Werner St. Louis. John Belmeyer is pilot. □ The Coca-Cola Company's DC-3 was brought by Ralph Whitworth, pilot, into St. Louis for an engine change and 100-hour inspection. □ Nationwide Insurance Co. DC-3 was at Remmert-Werner Inc., in St. Louis for installation of the Remmert-Werner lightweight landing gear doors and a paint job. □ B. W. Sandberg brought Greenlee Brothers DC-3 to Remmert-Werner for 100-hour inspection and relicense. □ R. B. Potashnick Lodestar came to Remmert-Werner Inc. in St. Louis for wing removal and installation of ARC 15 omni. □ The Westinghouse Electric Company Lodestar was brought to Remmert-Werner St. Louis for double engine change. Bud Little is pilot. □ Texas Gas and Transmission hand a 100-hour inspection and annual relicense at Remmert-Werner, Inc. St. Louis. □ Robert Veller brought the Super Service Motor Freight D18S in to Remmert-Werner in St. Louis for an engine change. □ Falstaff Brewing Corporation's DC-3 has a new exterior paint scheme, done by Remmert-Werner in St. Louis. Hank Haddock is chief pilot. □ Canada Packers Lodestar to *R-W* for installation of Super-92 engines. □ Ralph Piper had the Monsanto Chemical DC-3 in for an engine change. □ Warren Larson brought in the Riss & Co. Super DC-3 for double engine change. □ Bendix RDR-1 radar, Sperry H6 horizon and Collins 51V-2 receiver installed in the Libbey-Owens-Ford DC-3, Tracy Service, Chief Pilot. □ A new interior for DC-3 operated by Owens-Ill. Glass Co., Dick Riggs, Pilot. Ralph Cuthbertson, av. director for NBAA member J. P. Stevens & Co., chose cocoa beige, green and copper fabrics with frosted walnut Formica for the interior of their N.Y.-based D18.

■ **Potter Aircraft Service, Inc.** recently returned to service the Home Oil Co.'s Lodestar based in Calgary, Can. Inspection included landing gear overhaul, wing removal and X-ray of wing attach bands. Chief pilot was Don Douglas. □ Signal Oil DC-3 in for 100-hour inspection and installation of late type Madsen Strobe Lights. Chief pilot was Orlin Sorenson and co-pilot Roy Nielson. □ Utex Exploration Lodestar flown in to Potter Aircraft Service for stabilizer, angle of incidence change, installation of fiberglass saddleback, paint modification and routine maintenance. Chief pilot was R. Kaiser and co-pilot D. Daum.

■ **Northwest Aero Co.** Kimberly-Clark plane received complete overhaul of control system, landing gear system and cowling. □ Minneapolis Star and Trib's DC-3 received Sperry integrated system installation, engine change and 100-hr. inspection. Bud Mitchell and Wayne Hinderacher are the pilots. □ Monthly maintenance completed on Minn. Mining & Mfg. Co.'s fleet, at NAC's St. Paul operation.

REMMERT-WERNER, INC.—St. Louis, Mo.



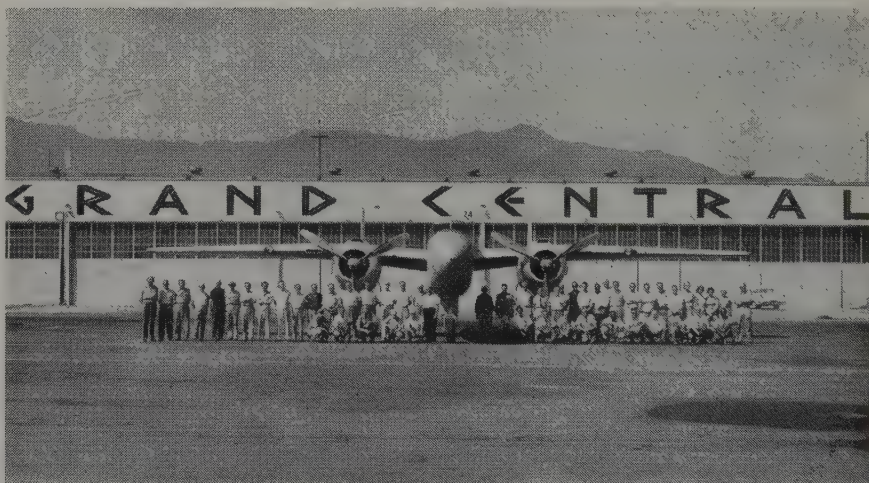
THE LARGEST service station in the country catering exclusively to business aircraft, Remmert-Werner covers all phases from light maintenance to complete rebuilding of airframes, engines, radios, etc., and carries about \$1 million worth of current active parts for principal aircraft, engine and equipment manufacturers.

Main offices are at Lambert Field, St. Louis; similar shop facilities are at Express Airport, Toledo, and Pompano Beach Airport, Florida. Each facility always has at least one DC-3-C47 in work because of its great popularity as an executive transport. R-W's principal product is the Super-92 DC-3, a 215-mph executive conversion. More than 100 executive DC-3's in the States are from Remmert-Werner; many more are in service overseas and in Latin America. Super-92 engines add about 20 mph to the DC-3-C47 design. Other refinements include lightweight wheel-well doors, auxiliary tanks, picture windows, radomes and wave guides. The Custom 18 Twin Beechcraft, with enlarged, modernized cabin and large windows, is another Remmert-Werner design.

Besides refurbishing for executive use, installations include instrument and weather flying radio and electronic equipment.

.....

GRAND CENTRAL AIRCRAFT CO.—Glendale, Calif.



THE ADDITION of a ramp, flight line area and buildings at Van Nuys Airport has increased Grand Central's Glendale facilities by 500,000 square feet. The property has access to an adjacent 6,000-foot runway which the city of Los Angeles plans to extend by 2,000 feet. The three buildings represent about 40,000 square feet of production space under cover, plus a concrete wash rack of 6,000 square feet.

Prior to final moving of machinery and shop equipment to the new facilities in July, personnel were engaged in the overhaul and repair of a C-47A. While buildings were being refurbished, services such as minor repairs, gasoline and oil sales and servicing, tie-down and storage were maintained. GCAC plans to provide services for the repair and overhaul of DC-3, A-26, B-25, Lockheed Lodestar, Convair 240 and all single-engine trainers.

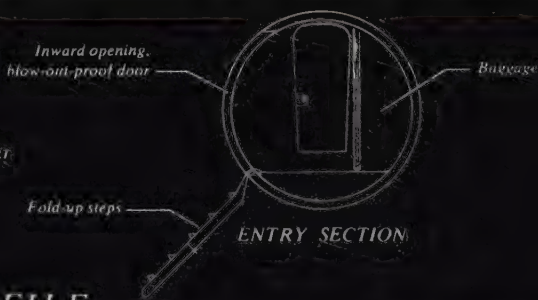
GCAC was started in 1929 by Maj. C. C. Moseley, WW I combat pilot and aviation pioneer who helped to train 26,000 WW II pilots and thousands of mechanics. By 1939, GCAC widened its scope to include maintenance, repair, overhauling and modification of aircraft and engines which are its stock in trade today. Pictured above are more than 50 employees, whose ten years or more of service with GCAC qualify them for membership in "The Old Timers Club of Grand Central Aircraft."

(Continued on page 71)

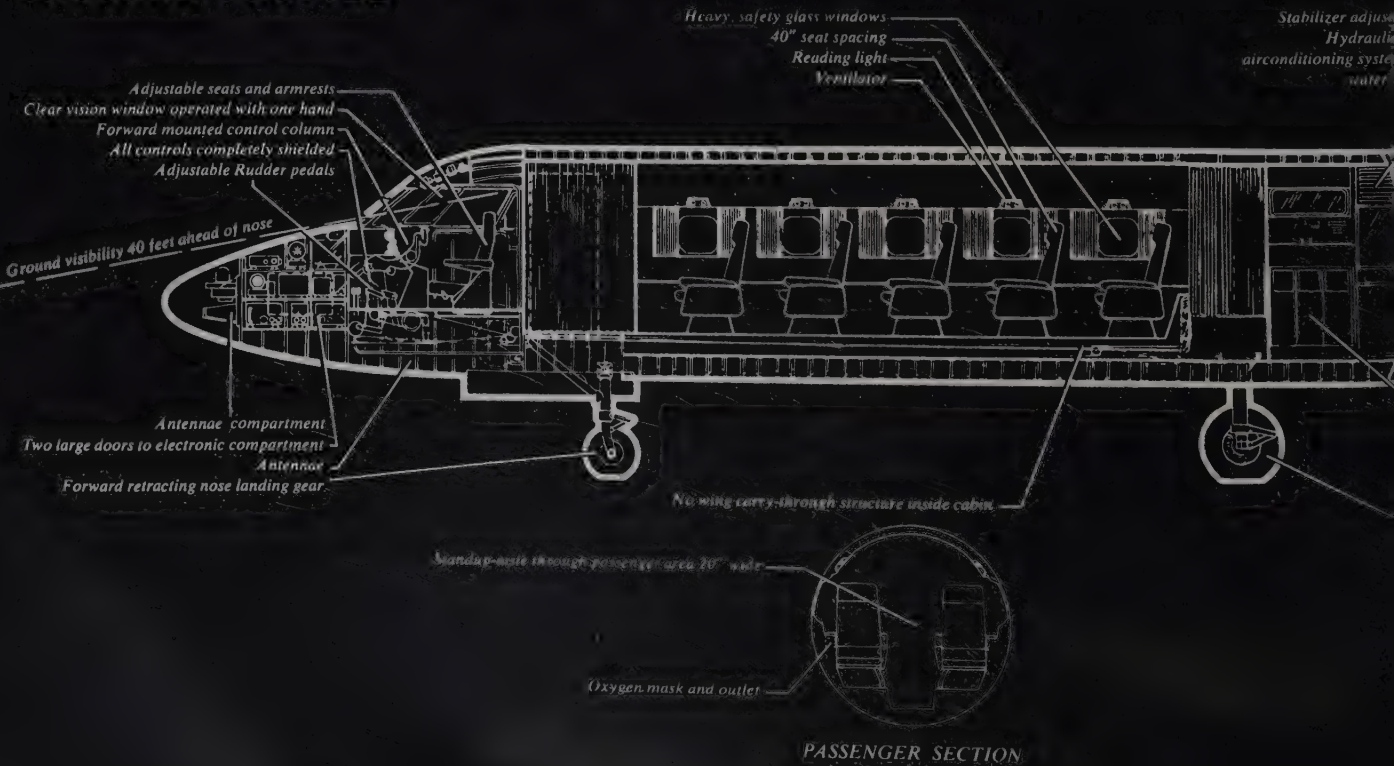


JETSTAR

THE LOCKHEED UTILITY JET TRANSPORT



INBOARD PROFILE





ANNOUNCING THE NEW LOCKHEED **JETSTAR**

a 10-passenger utility jet transport with
4 engines, designed to perform a variety of
Jet Age military missions at low cost.



Able to match the performance of large jet transports, but at a fraction of their costs, the new swept-wing Lockheed JETSTAR will cruise 500/550 mph at altitudes from 25,000 to 45,000 feet—for ranges of 2,000 statute miles and more.

Amazingly quiet (due to the aft fuselage mounting of engine jet pods) the JETSTAR is ideal for transition pilot training, heavy bomber crew training, and testing ground navigational aids. High-speed navigation training and gunnery practice, in-flight refueling indoctrination, and high-priority cargo carrying are

additional vital uses for which the JETSTAR was designed.

The JETSTAR carries a full complement of radio and navigation gear and is fully pressurized and air conditioned.

Like all Lockheed aircraft, the JETSTAR embodies simplicity of structure and functional systems—for high strength and reliability. Easy to maintain, economical to operate, the JETSTAR carries on the 25-year tradition of Lockheed's leadership in the design and manufacture of high-speed aircraft for the military, commerce and industry.

LOCKHEED *means leadership*

*Lockheed Aircraft Corporation
Georgia Division
Marietta, Georgia*

Power for tomorrow's Business Aircraft

In the atmosphere of day-dreaming created by the tremendous publicity of the airlines (at least 1960 before anything like a *fleet* will be in operation!), the continuing need for new and improved reciprocating engines has been ignored.

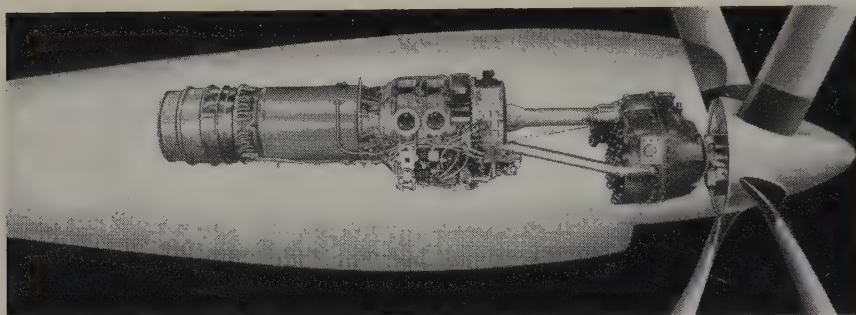
Yet, it is to the field of our presently available conventional engine types that business aviation must look for their powerplants for the next 10-15 years. Obsolescence and early retirement of the engines now powering both our single and twin-engine business fleet is financially impractical.

Supply of parts for repair, overhaul and rebuilding of these engines will be a continuing market. Pratt & Whitney, through subsidiary companies, is still making parts for -985,

-1830, R-2000, as well as making new -1340's. In the light-twin field, Lycoming and Continental expect to be in business on conventional engines for a long time, although Continental, at least, is investigating the light turbine field.

In the new field of prop-jets, which seems to be only slightly more certain than the pure turbine for executive aircraft, Allison still looks like the major contender. Both from the conversion standpoint, and the original-design view, the successful application of the turbo-prop engine suggests that in the next 5-10 years, any executive aircraft flying other than reciprocating engines will be powered by developments of this engine or its competition, the Rolls Royce Dart.

Allison, Napier and Rolls Royce engines will be discussed at the NBAA convention.



Allison 501D13

Produced as Power Package 501/606, this prop-jet engine comes equipped with Aeroproducts 606 turbo-propeller, full-feathering and synchro-phased.

One packaged nacelle is claimed by Allison to save the weight of 13 passengers and baggage, compared with current reciprocating engine nacelles being used.

Currently applied to the On Mark Model 450, Allison is studying application on the 501D13 for the Convair 440 and 340.

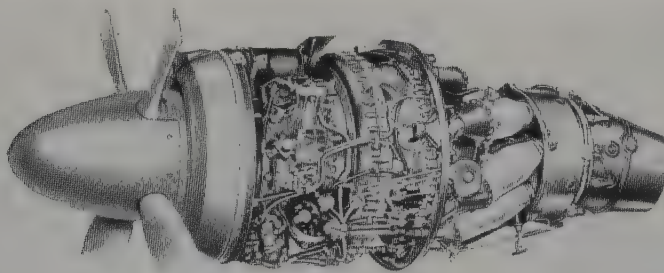
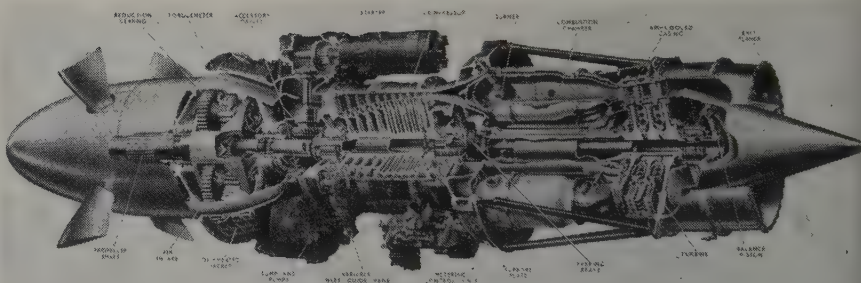
Napier ELAND

Turboprop engine with 10-stage axial compressor, six combustion chambers and three-stage turbine is an 1,800-pound unit.

Rated at 3,765 shp, the Eland adds 610 pounds of thrust at 12,500 rpm, or 4,000 equivalent horsepower.

The Eland is one development in a series undertaken by Napier when the evolution of the gas turbine engine foreshadowed the obsolescence of the piston engine.

Prototype was tested in the Convair 340.



DART Rolls Royce

The R.Da.6 propeller-turbine engine gives 1,600 shp, plus 365 pounds of jet thrust for take-off.

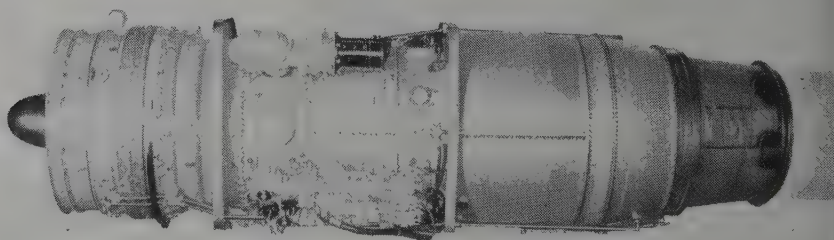
The Dart has proved reliable after more than a million hours of airline operation—its record better than for many piston engines. Since entering service, the approved overhaul cycle has been improved from 400 hours to 1,050 hours. Some operators have run to 1,250 hours on trial.

Application is the Viscount Executive.

TJ38 Curtiss-Wright

The "cool and quiet" Zephyr turbojet is the first jet engine developed exclusively for commercial airlines.

Developed jointly by Curtiss-Wright of Wood-Ridge, N.J., and Bristol Aero-Engines Ltd. of England, under a long-term engineering agreement, the economical and versatile Zephyr, rated at 12,500 pounds of thrust, provides what Curtiss terms "quiet operation unmatched by any other jet engine."



**NEW compass system
for business aircraft
weighs only . . .**

8 LBS

**. . . about half the weight of
comparable compass systems**

NOW . . . General Electric offers you the first lightweight, low price business aircraft compass system with an electrically driven, panel-mounted gyroscope—similar in quality to the gyroscopes developed by General Electric for military use.

General Electric's business aircraft compass system weighs only 8 pounds. Yet you can buy this lightweight, highly accurate system for approximately half the price of other electrically driven compass systems now on the market.

Like its military counterpart—the standard Navy G-2 Compass System—the business compass system is a highly accurate heading reference system. Maximum error in heading accuracy never exceeds 2 degrees, and you are assured operational stability at altitudes up to 40,000 feet.

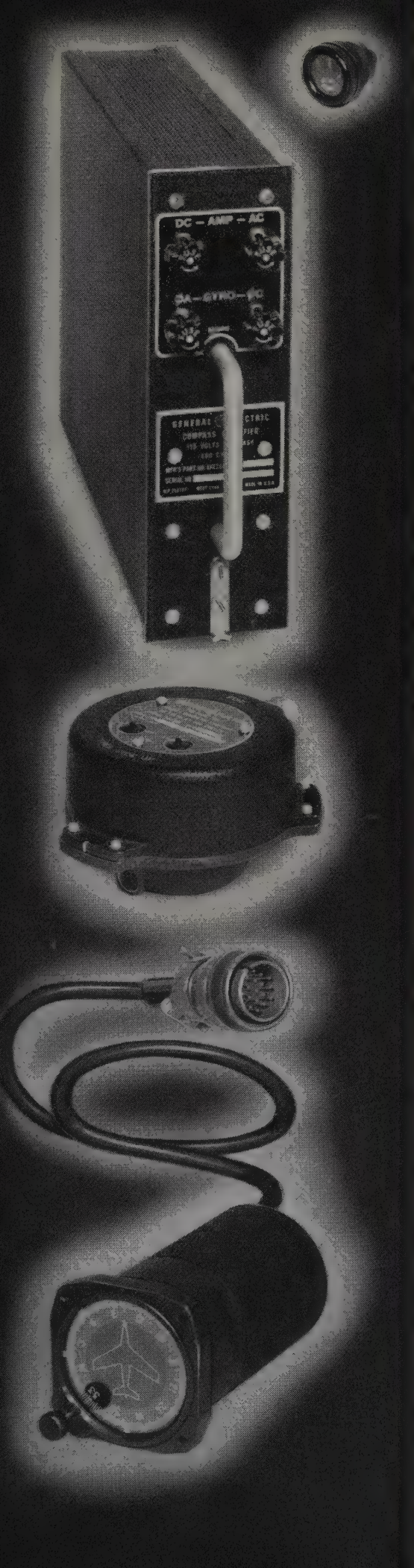
General Electric's business compass system can be installed—with speed and ease—on any business aircraft that has an a-c power supply. If a-c power is not available on your aircraft, an easily installed inverter can supply the proper power. The business compass system operates on only 24 watts of 115 volt—400 cycle, three-phase power.

General Electric's modern compass system will be displayed at your National Business Aircraft Association Forum in Denver, October 2, 3, and 4. Look for Booths 307 and 308.

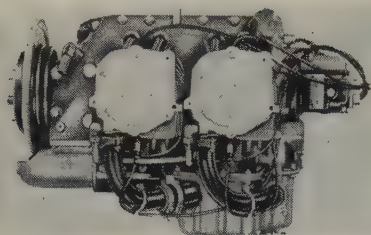
You can get 30-day delivery on General Electric's business aircraft compass system by contacting your nearby sales outlet for the Wilcox Electric Company, Inc., distributor for the General Electric system. If you would like more information on this modern system before you place your order, write today to Section 586-14, General Electric Company, Schenectady 5, N. Y. Ask for Bulletin GEA-6712.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

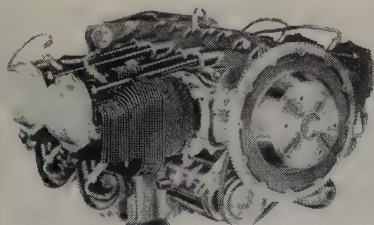


O-320 Lycoming



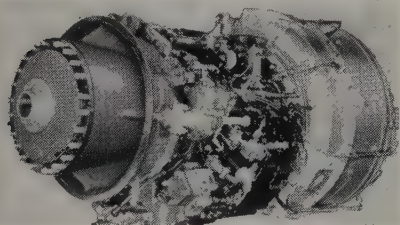
150-hp, 4-cyl, horizontally-opposed air-cooled engine. Applications include the Piper Super Cub, Tri-Pacer, Apache; Colonial Skimmer.

O-360 Lycoming



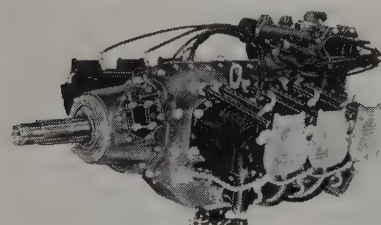
180-hp, 4-cyl, horizontally-opposed engine with the highest hp rating in its class. Used in new Beech Badger and Piper Comanche.

T53 Lycoming



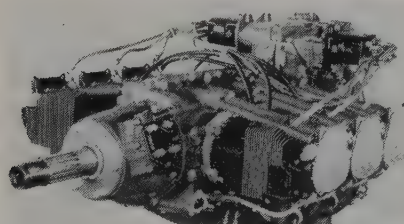
825-shp, free power shaft turbine engine is currently flying in the Bell H-40 and Kaman HOK-1 helicopters.

G0-480 Lycoming



270 to 295-hp offered, 6-cyl, horizontally-opposed. Applications include Aero Commander 560 series; and the Beech Twin Bonanza.

GSO-480 Lycoming



340-hp, 6-cyl, supercharged engine. Applications include the Helio Strato-Courier, the new Aero Commander 680S and Beech Bonanza.

AIRCRAFT ENGINES

Lycoming

Housed in 2½ million feet of floor space, Lycoming, a division of the Avco Manufacturing Corp. employs 9,000 skilled workers to man 6,000 machine tools.

The firm started operations in Williamsport, Pa., in 1908 as an automotive engine manufacturer. Through the years, these products were added: aircraft, marine and industrial engines; precision and volume machine parts; gray iron and aluminum castings; tank engines, fragmentation bombs and gas shells. In 1951, the firm acquired its present headquarters at Stratford, Conn.

The Williamsport plant today is their manufacturing center for light aircraft, industrial and tank engines. The Stratford plant produces Curtiss Wright R-1820 and R-1300 reciprocating aircraft engines, and is engaged in gas turbine development. Sub-contract work on aircraft engines and components is maintained at both plants.

Continental's air-cooled engines are used in some 70 different aircraft models and in more than 65 per cent of all twin-engine, executive-type aircraft.

Continental

First horizontally-opposed aircraft engine to be manufactured in the United States was the "old A-40," more than 25 years ago by Continental Motors Corp.

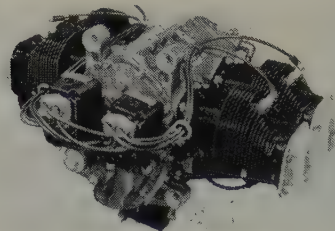
Since then the Company has developed into a principal source of power for utility planes.

Before the Muskegon, Mich. plant pioneered its A-40, the cost of engines was so high that few but the playboy sportsman could afford to own or fly the so-called "personal" airplane. Continental inaugurated the mass production of aircraft engines as a step which has been credited with doing more than any other single development to promote the growth of aviation, since Kitty Hawk.

In quick succession, Continental brought out the A-40, A-50 and A-65. The latter is still an important item. These engines and their successors share virtually all altitude, speed and endurance records for utility aircraft.

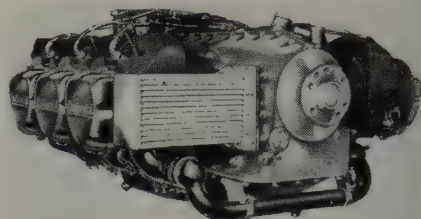
Current Continental production, moreover, powers a major segment of the country's rapidly-growing fleet of business aircraft.

A65 Continental



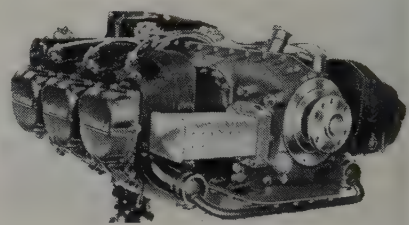
65-hp, 4-cyl, horizontally-opposed air-cooled engine has long been a standby for light aircraft. It is standard on the Piper PA-11.

O470-K Continental



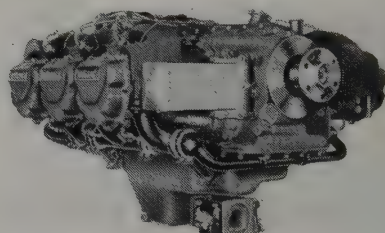
230-hp, 6-cyl, horizontally-opposed air-cooled engine is rated at 2,600 rpm. This 404-lb. power plant is applied to the Cessna 180.

O-470G Continental



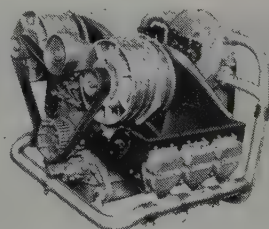
240-hp, 6-cyl, horizontally-opposed air-cooled engine is another in the O470 Continental series. Application is the Beechcraft Bonanza.

O470-M Continental



240-hp, 6-cyl, horizontally-opposed air-cooled engine used in the Cessna Model 310, a twin engine executive aircraft.

F50-470 Continental



260-hp, 6-cyl, supercharged fan-cooled engine delivers 260 net hp to the transmission. Application is Cessna CH-1 helicopter.



THE NEW LEARSTAR DEMONSTRATOR*

...from **LODESTAR** to *Learstar* step by step

Any Lodestar in the air today can now be brought up to date under a plan which combines low down-time with progressive modification leading to a complete Learstar. New standards of safety and efficiency are gained, structural reliability is increased, flight characteristics improved, cruising speed increased and range greatly extended. This is the "step by step" program that brings your Lodestar into the famous Learstar class — the world's only business transport that exceeds airline specifications.

Lodestar owners and operators are invited to write for details of PacAero's new "step by step" program explaining how the advantages of airline transport category 4-b can easily be obtained — how your Lodestar investment will be strengthened and how you can take advantage of favorable tax allocations. Regardless of what type of business transport you now own or operate, you will be interested in learning about Learstars now in the process of remanufacture in our plant, and how they may be "customized" to fit your specific needs. And, to provide complete, see-for-yourself details, PacAero's new Learstar* shown above is available for demonstration flight at the convenience of you and your executives. For appointment, please contact PacAero Commercial Sales Division.

PACAERO ENGINEERING CORP.

3021 Airport Avenue, Santa Monica, California
EXmont 1-5281

PACAERO



Combination step of Learstar Rudder Spring Tabs and Learstar Wheels and Brakes, shortens Lodestar's legal runway length by 900 feet.



Learstar engines and props step includes 1350 hp Wright R-1820-56A or -72A engines, new Hamilton-Standard 33D50 square tip props, new design short stacks.



Learstar remanufactured wings incorporate additional auxiliary fuel tanks providing total capacity of 1114 gallons. New leading edge configuration eliminates drag, provides greater stability.

Pilot Limitations Discussed at Santa Barbara

Col. Harry G. Moseley, Chief of the Aeromedical Safety Division, Directorate of Flight Safety Research, addressed more than 200 aircraft industry-Air Force personnel at Santa Barbara recently on the subject of pilot limitations.

Aircraft manufacturers will have to pay more attention to the physical limitations of pilots to cope with the enormous velocities and other hostile forces facing them in high-performance flight, the Colonel warned. He stated that a strong accident potential creeps into aircraft which are not designed with the limitations of human pilots in mind.

"The pilot has an intrinsic limitation in his depth and span of attention, acuity of senses and the degree and promptness with which he can react," Dr. Moseley said.

"One of the comparatively untapped sources for further reduction of accidents lies in the improvement of aircraft displays," added a research psychologist, Captain E. L. Brown, Aero Medical Laboratory at Wright Air Development Center, Ohio. "The job is very big," continued Captain Brown, "and the efforts being expended in solving problems are still comparatively small."

"The lack of a really large scale effort in research on aircraft instru-

mentation systems has cost more accidents than generally realized. Such things as making sure that pilots have a presentation by instruments that is convenient and quick are important. It is not so much the number of instruments as where they are located and how complex they are that is important."

During another discussion, R. A. Roche, director of research for Litton Industries of Beverly Hills, pointed out that the practical demands for anti-collision devices are such that they "are beyond the present state of the art," and there must be another answer to settle the current overwhelming problems in near-misses.

Mr. Roche stated that airmen are looking for other methods, as outlined by Edward P. Curtis in his report to the President, to make safe the over-laden sky, which will have three times its present number of aircraft in the next 20 years.

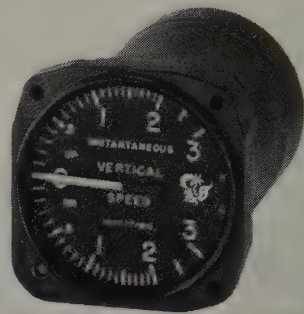
The Curtis report calls for essentially widening the airways, having a larger number of aircraft under controlled IFR flight, and restricting the space in which these aircraft will operate with non-IFR planes.

Also speaking was William Shultz, director of customer relations for the research division of the Bell Aircraft Company. His subject was "Landing Aids to Pilots."

He was the original project pilot for Bell's automatic landing system, and he

said he feels such a system is the answer. The goal is to make it available for use from the Piper Cub to the 707 although the military has first call on it.

Instantaneous Vertical Speed Indicator Now Available



Designed to eliminate the undesirable lag and inaccurate indications of standard r/c indicators is a new rate of climb instrument marketed as Merchandising Specialties, Inc., IVSI by Continental Development Corp.

Described as the first significant improvement in rate-of-climb instruments, the IVSI offers steady readability in turbulent conditions, highly accurate indications in a wide variety of conditions.

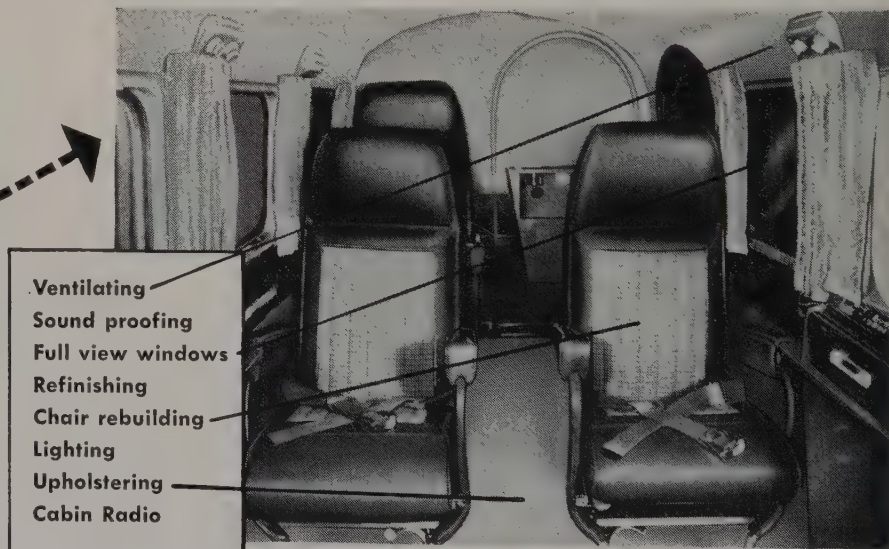
It is being specified as original equipment for the Boeing 707 and Lockheed Electra, and as a retrofit item on several major airline fleets.

MODERNIZATION by Experts

*There's every service you
need at Ohio Aviation*

The one-stop convenience of modernization service at Ohio Aviation is being used by a rapidly growing list of private and business aircraft owners of Beechcrafts and Lodestars. The comfort and relaxation of an Ohio Aviation engineering job brings living room relaxation to passengers. These and many other services are handled on a production line basis that keeps non flying time to a minimum.

1. **VENTILATING.** Fresh conditioned air furnished by Ohio Aviation's installation greatly increases passenger comfort.
2. **SOUND PROOFING.** Complete Fiberglass insulation on cabin surfaces drastically reduces sound level.
3. **FULL VIEW WINDOWS.** Jumbo double pane windows open the view—lower sound level.
4. **REFINISHING.** Interior metal surfaces



- Ventilating
- Sound proofing
- Full view windows
- Refinishing
- Chair rebuilding
- Lighting
- Upholstering
- Cabin Radio

finished in smooth durable lacquer to compliment cabin decor.

5. **CHAIR REBUILDING.** Deep, soft, foam rubber chairs, upholstered in your choice of leather or wool and dacron fabrics.

6. **LIGHTING.** Soft, diffused adequate lighting spreads through the cabin from these streamlined lighting fixtures.

7. **UPHOLSTERING.** In your selection of many wool or dacron fabrics. Installation of carpet and expert custom tailoring of chairs and wall areas.

8. **CABIN RADIO.** For standard broadcasts. The final touch for "living room" relaxation.

And many others. Ohio Aviation can give you any combination of modernization services desired. For prices on modernization work and for information on scheduling, call Charles Groff at MO 4-4646.

**THE OHIO
AVIATION CO.**
Dayton Municipal Airport,
Vandalia, Ohio

Maintenance Bulletin

These maintenance notes are compiled and edited from recent CAA air carrier maintenance branch and general aviation maintenance summaries, and mailed to NBAA members as part of their membership service.

AERO COMMANDER

Model 520

Wing Nose Ribs: Inspection disclosed wing nose ribs in various degrees of failure.

BEECHCRAFT

Model D-18-S

Tail Wheel Retract Chain P/N-404-188655: Considerable fin and rudder damage occurred as the result of the tail wheel collapsing due to failure of tail wheel retract chain. Examination of the failed link indicated that it was a progressive failure, possibly caused by metal fatigue.

Model G-35

Generator Main Bearing (front) P/N 954143: Several instances of accelerated wear and failure of the shaft to case bearings have been reported.

Model C-50

Baggage Door Latch (rear) P/N 50-400180-2: Retaining screw which holds the catch assembly, P/N 50-400287, to the lock cylinder unscrewed, allowing the cylinder and catch to part and the handle, P/N 50-400181, to vibrate to the "unlock" position. Operator reports placing a lock washer under the head of the retaining screw resolves problem.

Model D-50

Carburetor Heat Box Assembly: Carburetor heat control was inoperative. Investigation disclosed a number of shaft ball bearings in the heat box were worn to a degree of ineffectiveness. Suggest a rigid inspection of all bearings and shafts for excessive play.

Model D-50

Alternate Air Valve Assembly Door P/N-50-970023: Alternate air valve (door) failed due to metal fatigue attributed to excessive vibration. Air to carburetor was restricted, resulting in a 75% loss in engine power. The affected area can readily be inspected by removing air duct and filter.

Model D-50

Exhaust Stack P/N-50-950033-9: Exhaust stack failed at the radius, where it curves back from No. 3 cylinder (left engine).

BELL HELICOPTER

Model 47 G

Mast Assembly-Main Rotor P/N-47-130-114-9: The inner race of the main rotor mast bearing, P/N-47-130-110-1, had been turning on the mast and chafed the shoulder of the mast, P/N-47-130-114-11.

CESSNA

Model 172

Nose Gear Strut Clamp Cap P/N-0543018-1: Clamp that holds nose gear strut in position at lower firewall bracket was found broken at bolt hole ear. This clamp prevents nose strut from moving forward.

Model 180

Electric Wires to Flares: Number 2 flare fired without being actuated by the pilot. Investigation disclosed flare circuit wires under cabin floor shorted where they go through lightening holes in bulkhead.

Model 310

Top and Center Rudder Hinge Assembly P/N 0831000-34 P/N 0831000-28: Several reports disclose cracks appearing in the rudder hinge assembly. Cessna Service Letters 310-9 and 310-14 stress the importance of top and center rudder hinge assembly inspection and as a result many hinges have already been changed.

Aileron Hinge (outboard side of right wing): The outboard aileron hinge of the right wing was found cracked. Cessna Service Letter 310-7 called for immediate inspection of outboard aileron hinges, and Service Letter 310-15 suggested immediate replacement.

DeHAVILLAND DOVE

Model 104-6A

LH Fuel Tank Compartment: Excessive corrosion noticed in LH tank compartment on under side of top skin adjacent to wing rib No. 4. Corrosion apparently stems from exhaust gases entering a lightening hole and at the reinforced cutout (rib No. 4).

DOUGLAS DC-3

Model G202A

En Route to Midway Airport encountered flight of ducks altitude 2600 feet airspeed 135 knots. Seven bird strikes, one penetrated left windshield resulting in minor facial injuries to captain and first officer. Birds were green head mallards estimated weight four pounds. Operator considers item closed.

DC-3

During routine inspection, found 9 bolts broken in fuel tank cover attaching angle. Failures occurred at inboard end left main tank plate. Fleet campaign initiated to check all airplanes for similar condition. Airplane TSO 7988:00 hours. Open.

DOUGLAS DC-3

DC-3

En route rudder vibration was noted and aircraft yaw to right. Inspection revealed that the inspection plate over the trim tab drum had come loose at front causing a force to act on rudder. Inspection plate had been installed with PK screws instead of the eight thirty-second machine screws. All personnel cautioned of the above condition. Operator considers item closed.

Chicago: Glide path needle indicated on glide path with no flag showing. Aircraft was not on glide path. Grid of

5654 second RF tube V-102 in 51V2 glide path receiver was shorted to plate. During shop testing of the equipment, it was found that introduction of a short between grid and plate circuits of any tube in receiver RF section or IF section up to final IF tube V-106 could cause varying degree of fly down indication of the needle. Flag operation during tests was inconsistent but in most cases flag did not show. Collins Radio Company engineering department notified for possible engineering defect in 51V2 glide path equipment and requested to see if condition could be corrected. Operator considers item closed.

This refers to a report where the right rear landing gear brace strut, P/N 5005586, failed just above the weld at "Y" yoke. Additional information received from the operator advises that the manufacturing technique was satisfactory. Repeated loading and many hours of service caused a crack to start at the edge of the weld bead in the heat affected grain coarsened base metal adjacent to the weld deposit. When the initial crack had grown to sufficient length final failure occurred. Operator is replacing questionable assemblies with P/N 5112599. Operator considers item closed.

This refers to a report that while starting engine noted smoke in companionway. Additional information received from the operator advises that investigation revealed No. 4 fuel pressure line cracked at fitting sleeve where line enters tunnel which allowed fuel to spray into area under companionway flooring. Possible source of ignition due to loose external power receptacle which caused an electrical arc. Fleet campaign underway to inspect these fuel lines. Operator considers item closed.

DOUGLAS

DC-3A

This refers to a report that 9 bolts were found broken in fuel tank cover attaching angle. Additional information received from the operator advises that the bolts involved originated from 4 different manufacturers, therefore, it is not considered a question of defective material. It is considered possible that improper torquing at installation might have been a factor. All airplanes of the fleet checked for this condition and no discrepancies found. Operator considers item closed.

On landing roll while using ailerons for cross wind correction an almost uncontrollable aileron flutter developed. Aileron travel and control system thoroughly checked. Slightly loose cables was only discrepancy found. Airplane test flown and found satisfactory after cables tightened. Operator considers item closed.

DC-3C

Five minutes out vacuum to both groups flight instruments dropped to zero. Returned and cancelled. Piece of carbon paper blocked common air intake in electric tunnel. Fleet corrective action being taken—separate lines

to each filter and sealing tunnel to prevent entry of trash.

Pilot reported loss of fuel and oil pressure on left and right engines, 10 minutes from Malad, Idaho. Reduced power and landed at Malad. Inspection revealed engine oil diluted with approximately 5 gallons of fuel in each oil tank. Oil dilution switches were "on." Diluted oil drained and engines reserviced. Oil sumps and screen checked. Oil dilution system checked and found OK. Engine ground check normal. Aircraft released for flight to Denver. Suspect inadvertent operation of oil dilution switches, approximately 10 minutes from Malad. Switches were a positive position switch. Replaced switches with monetary type switches. Oil dilution switches are being changed to meet configuration of fleet and with monetary type switches; also oil dilution line on this aircraft did not incorporate a restriction airface as commonly used. It is believed that corrective action taken to prevent a recurrence is adequate. Operator considers item closed.

LOCKHEED

Model 18

$\frac{3}{32}$ Screw P/N-166193: The $\frac{3}{32}$ screw which attaches the end of the aileron control chain to the link, P/N-166193, was found in a near failed condition.

Model PV-1

(Super Ventura)

$\frac{1}{16}$ " Cable on Tail Wheel Lock: The $\frac{1}{16}$ " cable running from the elevator

bellcrank to the tail wheel lock was snagged by the tail wheel strut when the gear was extended. This caused a "nose-up" position to be applied to the elevators through the cable bungee being actuated. Howard Aero Corporation has developed a fix, which consists of the $\frac{1}{16}$ " tail wheel lock control cable being routed through a micarta block, which holds the cable free from the tail wheel strut as the gear is retracted and lowered.

PIPER

Models PA18 and PA22

Exhaust Muffler: An increasing number of reports are being received describing internal muffler failure. Sometimes this will create abnormal back pressure, resulting in reduced RPM. It is recommended that the muffler be inspected by looking into the exhaust pipe, aided by a flashlight, to determine the condition of the perforated tube and baffles.

Models PA22 and PA23

Battery Box Drain: A recent report indicates that some mechanics are not aware of the drain clamp provided to drain any accumulation of acid that might be in the bottom of the battery box. The box has a flexible drain tube which is normally closed off by the clamp and which should be opened occasionally to drain off any accumulation of liquid. It should be noted that some PA22's do not have this type installation.

Model PA22

Elevator Bellcrank Under Front Seat: Elevator bellcrank top bolt snagged flap mechanism fairing, resulting in locked elevators during landing. Investigation revealed bolt was too long for restricted area.

Model PA23

Control System Castings: Since Supplement No. 3 was issued, outlining difficulty with the elevator torque tube support casting, we have received several reports of cracked elevator horn, rudder horn, and front stabilizer attach castings. Cracks in the castings were determined by dye penetrant inspection.

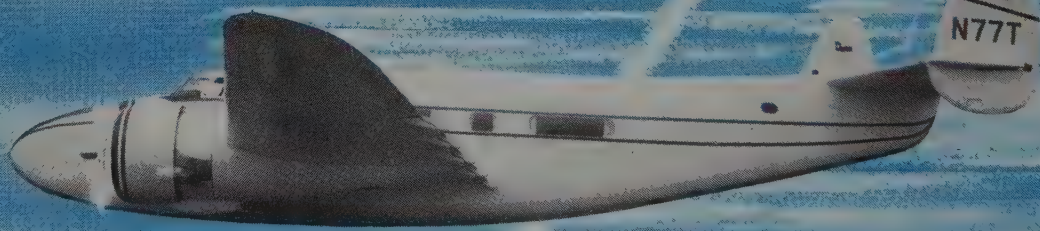
Model PA23

Fuel Line Elbow: Fuel pressure dropped upon turning on auxiliary tank. Investigation revealed fuel was only partially drilled, resulting in a very severe restriction in the fuel flow from subject tank.

A Timely Boost

The CAA is now studying the possibilities of JATO. If the studies are successful, JATO will be authorized for takeoff and emergency flight conditions. Two small JATO units attached to an aircraft will give up to 800 hp.

Lodestar speedup...



**Increases Speed Up to 30 Miles Per Hour
Inexpensive - Easy & Rapid Installation**

Dallas Aero Service has developed, perfected, had approved and has completed several installations of a new modification program which increases the speed of the Lockheed Lodestar up to 30 MPH. The modification program is the least expensive of its type available for Lodestar owners.

Tried, tested and approved by DAS and by Lodestar operators.

For further information, write, wire or call...
Dallas Aero Service.

DALLAS AERO SERVICE

3300 LOVE FIELD DRIVE • PHONE EL 2-2441 • DALLAS 19, TEXAS

COMPLETE ONE-STOP SERVICE ON CONVENIENT LOVE FIELD

SAFETY EXCHANGE

"Safety" is a word that has been bandied about so much lately that some of us grow a little tired of hearing about it. "Proof of the pudding is in the eating"—"we're still flying"—"we haven't had a serious accident"—"we're safe." Accidents are things that happen to the other fellow, that we read about in CAB reports, newspapers and magazines.

Fortunately such an attitude is not too widespread in civil aviation. From the first dual, a pilot is coached in terms of safety—accidents are things that happen *because*—and the pilot is taught to watch out for the "because" in the hope of eliminating the resultant accident. Is there any pilot of experience that hasn't had a layman say to him—

"If you are so perpetually concerned about safety and watching out for accident causes, why do you fly? Where is the pleasure or satisfaction?"

There are many good answers to this. We are sure each pilot reader has his own—maybe some include—

"Safety consciousness in flying is a state of mind, of alertness which is automatic, habitual so that attention can be freely given to enjoying a flight" or—

"The rewards of flight in satisfaction and pleasure are such that a state of constant alertness is a small price to pay," or—

Well, you name it!

Have you ever met a pilot who doesn't avidly read and discuss aviation accident reports? Is this, then, a morbid preoccupation with death and injury? We think not. Instead it is a healthy acknowledgement of human frailty, a tacit denial of the layman's accusation that pilots look upon themselves as superior beings.

The U.S.A.F. Flight Safety Re-

search is currently delving deep into a study of "pilot error" as a contributory cause of accidents, looking at "the sequence of behaviors, i.e., perception, decision and reaction involved in any conscious act." Remember how pilots used to react to the term "pilot error?" Now that "Human Engineering" has attained a respectable position in the drive to eliminate many of the design factors that foster and lead to "pilot error," the latter term has lost its sting. The surviving brotherhood of airmen look at a "human error" accident causative and say, "Why did he, a more experienced pilot than I, do this, or fail to do that?" In no other large field of endeavor do participants strive so hard to learn from the mistakes of others. Flying is safer not only because design is better or facilities are better, but pilots are making it safer.

SKYWAYS, is devoting a department on SAFETY, and will bring to the attention of its readers as much of the broad field of aviation safety development as can be selectively classified as "pertinent" to the use of aircraft for business, whether personal flight or as a large corporation operation.

This edition of SAFETY emphasizes within the limits of time and space, some of the manufacturers and Co.'s in aviation and related industries who develop safety devices that are applicable to business flying. Again, if we fail to mention some, it is because of random sampling and we urge your serious consideration and participation in Safety Exchange each month, of any product offered to safeguard and increase your enjoyment of flight as a business tool.

aircraft and over-run landings or aborted takeoffs. Ability to adjust to gross weight variation to avoid missing a light aircraft or unnecessarily damaging it, as well as handling heavy conventional or jet aircraft, is another factor. This is a development to watch!

Simulators

Because weather has always been one of the greatest deterrents to safe flight completion, the need to successfully cope with this factor has been number one priority with the military and airline branches of aviation since well before WW II. With outstanding exceptions most businesses accepted the necessity of relying on the airlines for safe and sure air transportation. During WW II facilities, equipment and techniques were so improved for weather flying that it became readily apparent that the means were at hand for business to "take off" under its own power. Industry and government produced the equipment and facilities. Until WW II, the techniques of "bad weather" flying hung on the arduous, expensive and frequently dangerous practice of "learning by doing." "Fog licenses," as they were called, could only be earned by stooging around in the gradually more crowded airspace, half-blind, practicing *getting into* and out of unsafe flight attitudes, aurally groping along unreliable and inaccurate radio flight paths and letting down, frequently more by guesswork and much adrenalin, to the general location of a fog-shrouded airport—in the tenuous hope of espying the runway in time to effect a safe landing. Truly "blind" flight, remember?

Thanks to WW II, the Air Force and Ed Link, the military and the airlines demonstrated that much of this dangerous but necessary schooling and prac-

Civil Runway Barriers For Emergency Stopping

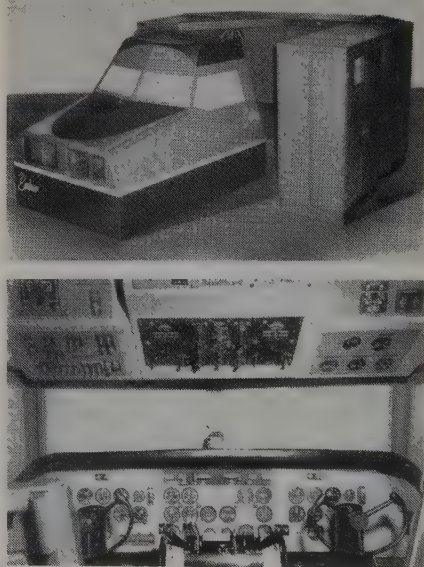
This is a new field that hasn't received much attention until the imminent threat of civil jet operations forced it. V₁, V₂, "Go-No Go" instrumentation, reverse props, airbrake flaps, better wheel brake designs, better runway traction surface, longer runways, overrun areas, all of these have contributed to safer operation as gross loads have increased and landing and takeoff speeds increased.

Overshoot accidents are still with us, at least seven such in 1956. Numerous "emergency"-classed landings where hydraulic failure occurred have not been catalogued but emergency equipment is called out at civil airports probably more for this than any other condition.

It is conceivable that arresting gear, suitably adapted to civil use, could

have saved many of the reported incidents and many others in the past or yet to come in the immediate future. Design features and psychological objections must be dealt with. The E. W. Bliss Co. in Philadelphia, Pa. are engaged in this research as is also the All American Engineering Co. of Wilmington, Del., and other companies. Some contemplate systems employing heavy chain drags, hydraulic or water pistons, etc. Actuation of arresting gear by either remote control (tower) or aircraft triggering are both contemplated. The recent CAB report on the TWA Martin accident at Las Vegas, Nev., reveals a possibility that the "go-around" that resulted in the accident could have been eliminated by overrun arresting gear.

If self-actuated, timing or weight calculators may have to be designed to *discriminate* effectively between conventional and tri-cycle gears, taxiing



Illustrating the graphic realism of the cockpit layout. (Flight Safety, Inc.)

tice could be as well, and definitely more safely, done by simulation in a ground device in the corner of a hangar. So positive and impressive was the impact of Ed Link's device on aviation that much of the industry frequently refers to any of the more modern, and truly "simulator" devices as "Links."

Business aviation left low pitch and started to cruise when, combined with the new IFR facilities and techniques, true simulators by which to safely acquire and maintain proficiency became available to the civilian market. Link still a leader, Dehmelt, Curtiss-Wright, Engineering & Research Corp., Westinghouse, and others entered the field and today both personal business and professional corporate crews either have access to company maintained simulators and training departments, or regularly take periodic proficiency check-ups with such organizations as Flight Safety, Inc. in New York, Reading Air Service, in Reading, Pa., Embry-Riddle in Miami, to mention only a few. Someday it may be unnecessary for a pilot to demonstrate IFR proficiency in actual flight and very soon prohibited in hi-density areas.

The use of the simulator to duplicate emergency conditions which either could not be simulated in actual flight or only at an unjustifiable risk of safety, has been the major step forward in increasing actual in-flight safety. The contribution of the manufacturers in building into these devices the realism of true flying can only be hinted at

by comparing the recent and past records of flight safely completed with mechanical or electronic deficiencies, emergency landings and safely completed take-offs where failures of one nature or another have occurred and subsequent safe landing.

Probably the most fruitful immediate field for simulators is the transition training for pilots into the new light twin business aircraft. The age-old dilemma of acquiring "experience" to cope with the emergency situation has been resolved by "synthesis!"

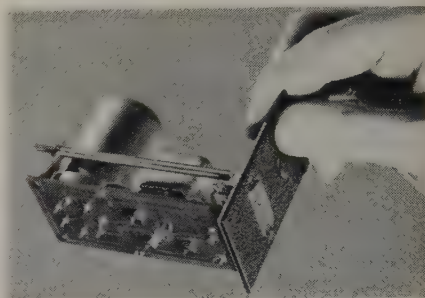
Fire Detection

Possibly the greatest fear of any civilian pilot is fire in the air. No situation is so immediately desperate, nor difficult to cope with once allowed to progress beyond the starting stage. Some of the greatest tragedies of the air (UAL DC-6 over Bryce Canyon, Utah, LAV Constellation off New Jersey coast, etc.) resulted from unmanageable inflight fire. Fortunately there have not been too many instances of business aircraft crashes laid to this cause (notwithstanding frequent layman eye-witness accounts of fire or explosion in confused time-sequence recollection). Still the danger is always there and despite the early promise of less volatile jet and turbo-prop fuels, it looks like it will remain with us.

Inasmuch as airframe manufacturers decline to seriously consider and meet the problems associated with designing

pilot-controlled jettisonable power-plant units, engine fire (primary cause) must be dealt with by improved techniques of prevention, detection and extinguishing. Since extreme heat is an unavoidable characteristic of engine power, the early detection of incipient over-heat or heat where there shouldn't be heat, places prevention properly within the sphere of detection.

Thus it can be truly said that such fire detection systems as produced by Edison Co., Fenwall, Sperry, Simmonds Aerocessories, Fireye and others, are as much preventative devices as detection. Unfortunately many of the lighter business aircraft cannot accommodate the systems so far designed and offered. It is hoped that some effort will be made to correct this situation and produce same at a cost that will enable a rewarding response.



Edison Fire Detection system detects flame or overheat within ranges of 250-900° F.

Captain Shelby Maxwell

Chief Pilot, Burlington Industries; holder of Airline Transport Rating; Member of NBAA; QB's; Million Miler, Former B-24 Test Pilot; Chief Pilot for Burlington Industries since 1945.

"Pilot Proficiency is number one on our safety program.

"That's why all the Burlington Industries pilots participate in Flight Safety, Inc.'s Professional Pilots' Refresher Training Program."



Flight Safety, Inc.

Municipal Airport
Houston, Texas

LaGuardia Airport
New York

Midway Airport
Chicago, Illinois

However, in the medium twins on up, no business aircraft can afford the gamble.

For many years the Edison Instrument Division has pioneered, developed and produced superior quality lines of instruments for the Aircraft Industry. The most recent contributions include the Edison Continuous Cable Fire Detection System and the Edison Pressure Indicating System.

The semiconductor type cable is unusually flexible, is extremely sensitive

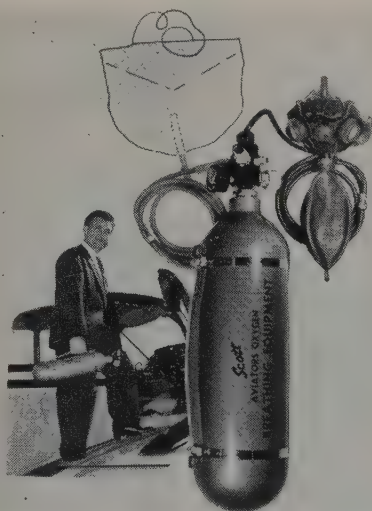
Hi-Altitude Flight and Oxygen

There used to be a part of the art of flight planning which was called altitude selection. Today it is still possible that business and other pilots dutifully trudge into the weather bureau office and among other things examine the reported or forecasted winds aloft and select an appropriate altitude for their flight. If VFR is practical, that is!

This is fast becoming an obsolete technique or at least somewhat reversed in IFR planning. Now you make a note of the above wind data so that when ATC tells you at the end of the runway before takeoff (sometimes) what altitude you are going to fly at, you quickly re-compute your flight data and find out if "this trip is really necessary." You could go faster by dog-cart!

In all seriousness, every professional pilot knows that the ATC problem is one of insufficient airspace, routes and altitudes for today's traffic. And so he is prepared for the exigencies of medium, hi-altitude flight if unpresurized. Since aviation medicine men (no crack intended!) recommend use of pilot oxygen at or above altitudes of 8-10,000 feet and passenger protection at or above 12-14,000 (no individual pathology considered), the availability of an easily employed and adequate oxygen apparatus for crew and passengers is a must for intentional IFR flight of any substantial duration in either the hi-density Eastern airways or the mountainous west.

Pioneer in civil aviation oxygen needs is the Scott Aviation Corp. of Lancaster, Pa. Almost single-handed they



have developed and encouraged the use of oxygen for safety and practical business flying in all categories.

The new Scott "Executive" just announced for business and civil use the world's lightest weight complete oxygen system, weighs only 12 pounds and serves two persons to 20,000 ft.;

Permits private and executive fliers to enjoy the advantages of high altitude flying including smooth over-the-weather flights, favorable winds aloft, improved radio navigation, longer range, and better engine performance;

Protects against high altitude hazards of oxygen lack (the big factor in "flight fatigue"); poor judgment in emergencies, reduced vision, slow reaction time, and false self-confidence.

The new unit is simple to use. Just turn valve, plug in masks and breathe. It may be placed anywhere in the aircraft or mounted with clamps for a fixed installation. Includes 22 cu. ft. cylinder, flush-strap carrying handle, miniature regulator, gauge and two AN mask outlets.

Statistics as to how many unexpected accidents started with oxygen starvation are even fewer than those where oxygen-equipped pilots saved the day. Part of the objections to such safety aids has been their awkward application and subsequent discomfort. This has been overcome by development of different types of masks for emergency use, for continuous use, for children (who frequently resist strenuously) and by disposable masks for sanitary reasons.

This is not the only justification for oxygen availability. Present medical practice and first aid prescribes pure oxygen for numerous physical emergencies which can occur at any level from sea level up. We are sure many war-time pilots can remember at least one?

Engine-Out Safety

Many professional pilots will recall that a frequent stock joke when speaking of twin-engine transition is the subject of the pilot who feathered the good engine when the check pilot "pulled" the simulated failure. Not as many may admit that they did just exactly that.

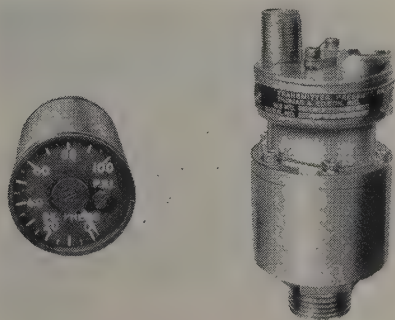
Nevertheless, the critical time element in recognizing the failed engine on takeoff, the amount of failure and then taking proper action, has been and still is a major factor in twin engine safety. Auto feather techniques of airline aircraft leave much to be desired and again, any two pilots can enjoy a good argument over the merits of auto feathering. One technique for resolving this problem without depriving the pilot of choice of action is offered by Safeather, Allied Instrument Corp.,



Houston, Texas. "Safeather," based on engine mount torque sensing, shows when to feather which engine, without auto-control complexity. The simple indication is on the feathering button or propeller control lever.

to heat and is virtually immune to fire or mechanical damage. It detects fire at any point along its length and is approved for military and civil applications under latest specifications.

The Edison Pressure Indicating System is designed for installation on both



jet and reciprocating type engines to give the pilot a continuous indication of oil pressure. Non-electronic, unaffected by shock or vibration the transmitter can be mounted directly on the engine without external tubing connections. Three copper wires carry the pressure signal to the indicator on the instrument panel.

On January 2nd, 1957, the great pioneering organization of the electrical industry, Thomas A. Edison, Incorporated, was consolidated with the well-known and eminently successful McGraw Electric Company to form one of the strongest manufacturing and creative forces in electronic fields.

The new organization contains 23 divisions and subdivisions in the United States and Canada with assets in excess of \$100,000,000.

During more than half a century the two parent companies have pioneered, created and grown in the production of a wide range of electrical and electronic equipment. Plants have been added, expanded and improved; equipment has been progressively modernized, and facilities enhanced in all categories; operating staffs have gained steadily in experience, manufacturing skills.

"See and Be Seen"

Currently the greatest emphasis is being laid on the hazards of mid-air collision in VFR flight. Closure speeds, hi-density areas, ATC control of all airspace are common subjects today and any two or more pilots or aviation interests assembled in one location can be counted on to produce a "Donnybrook" free-for-all if any of the above "fighting words" come up. While the arguments rage, a few companies in the aviation and associated industries and some forward thinking pilots have been working to produce a practical immediate easement of this problem.

During WW II, for reasons of identification, air line planes put flashers

into their position light circuits (why were they ever called "navigation lights?"). When the happy discovery was made that this increased their conspicuity at night, some airlines went light happy and their equipment soon resembled the once-familiar advertising blimps. The first post-war business aircraft soon followed suit on the flashers.

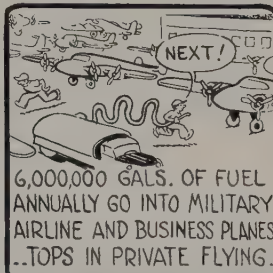
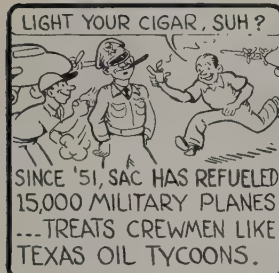
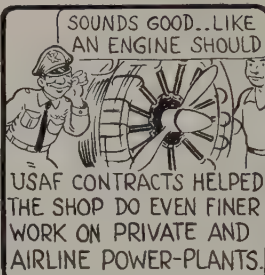
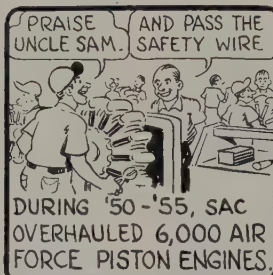
As congestion built up around terminal areas and on airways and speeds increased, it was realized that even these displays had insufficient range of distinction from metropolitan area ground lights. The justly famous Grimes Company responded with their rotating hi-power airplane beacon in red and amber. Soon most airlines and business aircraft sported this device.

Complaint was soon heard that conspicuity was fine but resolution of flight path was more important. Pilots were not interested in aircraft on diverging courses—some means of telling "pertinent" traffic as ATC gently puts it, was mandatory.

Two experienced pilots widely separated came up with tentative solutions that today are the best available. The Madsen Hi-Intensity Sequence Flashing Lights, sponsored by Trans-Ocean Airlines (and Aircraft Engineering & Maintenance Co. of Oakland, Cal., Capt. Andrew Madsen, inventor) employs three Xenon lights spaced along top and bottom of an aircraft fuselage,

SAC Silver Jubilee Newsreel

BY JACK PATTON



Don't miss SAC's Silver Jubilee P&WA Engine Forum, Sept. 25th!



AC, Aeroquip Corp., Bendix Products Div., B. F. Goodrich, Canadian Pratt & Whitney, Delco-Remy, Eclipse-Pioneer Div. (Bendix), General Logistics, Glidden Co.,



Folks are mighty welcome at Southwest Airmotive... whether in civvies or in uniform... for a cup of coffee... or a contract involving 6,000 engine overhauls. These cowhands had a special "Howdy" some years back for flyers from up Oregon-way.



Hamilton Standard, Lycoming, MacWhyle Cable Co., Miracle Power, Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric,



In 25 years, SAC's physical layout has changed a lot, but the friendliness and the drama on its ramp, and in its shops, are pretty much the same. The reception posse for an F-80 pilot recently included 6 ecstatic Cub Scouts. For a pert blonde flyer, we brought out a real, live Texas Ranger, complete with the Lone Star flag.



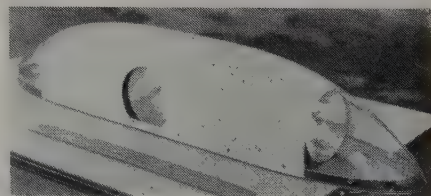
Pesco, Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla Div. (Bendix), Utica Div. (Bendix), and Willard Batteries.

1932 A QUARTER CENTURY OF LEADERSHIP 1957
Southwest Airmotive Co.
LOVE FIELD DALLAS
DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO



light in weight (whole system under 12 lbs.), consumption is less than 160 va and output is over 140,000 beam candlepower. Sequence of flashes is from aft to forward once a second, with a 1/16 second interval between bulbs. The result is an extremely conspicuous blue-white "pulse of light" indicating the aircraft's direction of travel. The results have been very gratifying and several airlines plus corporation aircraft have taken the lead in service testing the equipment.

In Minneapolis, the Aircraft Danger Light Corp., formed by Capt. H. William Atkins, associated with Northwest Airlines, offers the Relative Danger Area Light. Atkins' approach is based



on instinctively alerting a pilot to another aircraft's position and flight path and the relative urgency of the situation. In daylight VFR a pilot is not as urgently concerned when observing an aircraft on a diverging course from him or even an aircraft ahead on same or parallel course. The relative speed factor permits more time for analysis and reaction. Converging courses (constant bearing especially) and on-coming courses leave little time for interpretation and reaction.

(continued on page 75)

**In Any Aircraft...
Under Any Conditions...
You Can Rely on**

wilcox CANARI Equipment

COMPLETELY RELIABLE COMMUNICATIONS. Model 705 VHF COMMUNICATIONS RECEIVER

The ultimate in rapid, accurate ground-to-air communications, the Wilcox Model 705 provides unmatched reception of signals from CAA Towers, Communication Stations and ATC Centers. The 705 also serves scheduled airlines well in maintaining contact with Operations Departments.

MORE CHANNELS . . . 560 instantly available, remotely selected frequencies; every 50 kc channel from 108.00 thru 135.95 mc. **MONITORING . . .** of omni weather broadcasts and CAA voice communications on one omni frequency with the VOR receiver tuned to another channel. **FASTER, SIMPLER SELECTIVITY . . .** selected channels come in instantly. Spacing is such that adjacent channel rejection is 80 db minimum. **GREAT-ER RANGE . . . GREAT-ER INTELLIGIBILITY . . .** never before such range and freedom from noise and unwanted signals. **SMALLEST, LIGHTEST WEIGHT UNIT AVAILABLE . . .** $\frac{3}{8}$ ATR 12½ lbs.

ACCURACY AND STABILITY AT ITS BEST. Model 706 NAVIGATION RECEIVER

While the 706 occupies only $\frac{3}{4}$ ATR and weighs only 27 pounds in its heaviest version, into it have gone years of research and development. The end result is a unit that gives you the features you want.

VERSATILITY . . . use for ILS Localizer, VOR Signals and all communications channels as well (receiver portion is identical to 705 Communications Receiver).

RANGE OF RECEPTION AND PRESENTATION . . .

following types possible: ILS Localizer — tone comparison, including flag alarm. Manual VOR — on cross-pointer meter with manual bearing selector. Full Automatic Instrumentation — on Radio Magnetic Indicator. Voice — on Localizer and VOR stations as well as communications channels.

POSITIVE RECEPTION . . . 50 kc channel spacing from 108.00 thru 135.95 mc. with selection of 560 individual channels. Every channel clean and clear.

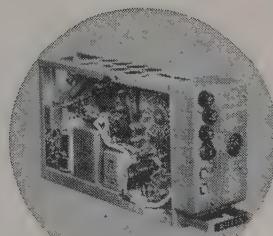
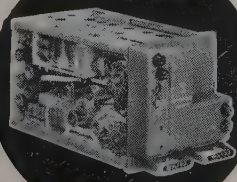
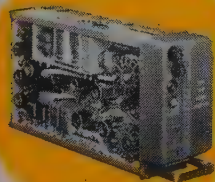
HIGH IN POWER...SMALL IN SIZE AND WEIGHT. Model 707 VHF TRANSMITTER

Imagine a unit that is only $\frac{3}{8}$ ATR and weighs only 13½ lbs. that will provide 25 watts minimum power. Here is the ideal transmitter for both commercial and corporate aircraft that gives you:

CLEAR CALLS . . . with extremely low noise and distortion levels. Audio is engineered especially for the speech frequency range. Internal modulator capable of 100% modulation provides full voice power.

QUICK TUNING . . . of 360 channels with 50 kc spacing between 118.00 and 135.95 mc. Tuning is accomplished through an electric motor and precision chain drive for the highest degree of mechanical reliability. Highly stable crystals are used in a frequency synthesizer circuit to produce all 360 factory installed channels from just 38 crystals. Here is the perfect companion to the 705 VHF Receiver for reliable communications every time . . . all the time.

FOR COMPLETE DATA ON THESE AND OTHER UNITS OF THE WILCOX CANARI SYSTEM, WRITE, WIRE OR PHONE . . .



wilcox

ELECTRIC COMPANY, INC.
Fourteenth and Chestnut
Kansas City 27, Missouri
U.S.A.

A "SPOT-CHECK" OF AVIATION ELECTRONICS

In picturing the astounding rise of civil aviation after World War II, much attention has been drawn to the unquestionable stimulus of modern airframe and engine design. Commentators have likened this proud development as the door that opened into the expanded vista of civil aviation.

If better and higher performance airplanes was the door into this new era, the key that unlocked that door was the high state of the art of aviation electronics as we know it today. Without today's better navigation systems, both ground and airborne, without modern communications, the most up-to-date high performance airline or business plane would hardly dare stir off the ground.

We laughingly allude to the helmet-and-goggles era of civil aviation that preceded WW II. Excepting the professional ranks of the struggling airlines, let us not joke—civilian aviation was composed of daredevils, heroes and record-seekers—Our "OX5" club members today.

Very soon after hostilities ceased, VHF nav and communications techniques made it clear that now any intelligent, conservative individual could plan a cross-country flight of serious purpose with reasonable assurance of atmospheric-free radio navigational guidance and position fixing at any point along the route; equally reliable and easily understood communications of vital weather and other operational information and finally; accurate and easily flown low instrument approach capability when weather deterioration threatens the safe completion of the flight.

This, then, is what modern aviation electronics has meant in the growth of business and all civil

aviation in this last decade.

Who are the companies that have created this program? Their names are legion and range from names that have been time honored for their association with aircarrier and military aviation, that are now extending their engineering skill and experience to cover the growing business and personal aircraft fields. It includes firms that have arisen post-war to pioneer the development of low-cost, quality avionic gear and by so doing, have become synonymous with safe, practical flying for every pilot, whether personal business pilot, pleasure pilot or professional company pilot.

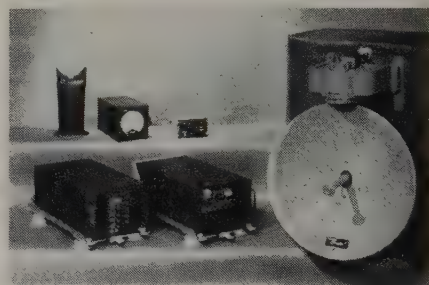
Unfortunately, time and space prevents the intimate, all inclusive coverage of the avionics industry that NAVICOM would like, hence we have instead prepared an editorial "spot check" of a few of the outstanding producers and their lines, and remind our readers that there are again as many more not mentioned whose products are equally deserving of your patronage and reliance.

Similarly, there are many manufacturers of component parts and suppliers to the aviation radio, instrumentation and electronic control fields that a spot check process must necessarily miss. In this process, we have tried to be most inclusive on producers of equipment currently emphasizing service to the business aircraft market. As this market continues to skyrocket, more firms such as GE are entering the field.

We do not forget the many firms who pioneered electronic control devices such as Sperry. Sperry made an autopilot before the end of WW One and the Zero Reader set the pace for all similar devices.

Engine Analyzers, Low Range Fuel Flow indicating systems and their well-known RDR-1 Airborne Radar are hallmarks of the name Bendix. Less well-known is the Bendix move to foster a system of navigation well known in Europe but overshadowed here by VOR/Tacan. If Bendix is right, DECCA for short range domestic and DECTRA for long range and overseas navigation is so superior to the chosen (?) U. S. system in accuracy, ease of use for all classes of aircraft and economy, that a repetition of the unlamented DME/Tacan controversy is in the offing. So far, only helicopter operators have shown substantial interest but if the quality and engineering record of Bendix is on the block with Decca as the best system, this could be the dark horse when the flying public grows too weary of nav systems designed for the military and perpetually notam'ed.

Bendix' most prominent product is Bendix Aviation Corp. Airborne Radar.



Model — RDR-1 B
Weight Uninst. — 117.5 LBS
Frequency — 9375 mc (X-band)
Power Output — 40 peak kv
Primary Power Drain — 770 va, ac (115 V) 24 W, dc
Iso-Echo Contour Circuitry — Yes
Range — 20, 50, 150 miles
Dish Size & Beam Width — 22 degr. & 3.8 inches
 30 degr. & 2.9 inches
Scan — 360 degr.
Scan rate — 15 rpm
Antenna Pattern — Pencil & conscan
 squared (fan) beams

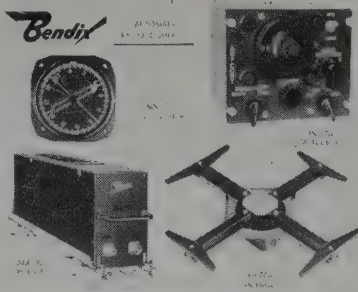
Antenna Tilt — ± 15
Stabilization — ± 25 degr.
Scope Size — 5 inches
Price Uninst. — \$13,192 with single
Approx. Inst. cost — \$5000-\$7000
Model

— RDR-1C (Same as RDR-1 B except:)
Frequency — 5400 (C-band) mc
Power output — 75 peak kv
Primary Power Drain — 725 va, ac (115V)
 24 W, dc (28 V)
Dish Size & Corresp. — 22 degr. & 7 in.
Beam Width 30 degr. & 4.7 in.
Antenna Pattern — pencil beam
Price Uninst. — \$12,112 with single indicator

Bendix Aviation Corp.

Long known for quality radio navigation and communications equipment for airline type aircraft, Bendix has turned its attention to the growing business fleet, including light twins. A case in point is the development by the Eclipse-Pioneer Division of miniaturized instruments. So far, they are offering an air-driven Turn & Bank, Rate of Climb and a magnetic compass in a 2.375 mounting. Among their outstanding communications and navigational radio is their NVA- & RA-21A navigational package offering complete VHF coverage.

Probably their best known line in times past was their DF equipment. Today's line offers two features, an Executive



Compass System including a new type Remote Reading Directional Gyro and Autosyn Compass Indicator; and the justly-famous flush-mounted magnetic ADF antenna.

Transistorized Audio Control Panels,

Dayton Aviation Radio & Equipment Corporation (Dare, Inc.)

DARE, INC. was organized in March 1946. It was founded as an aircraft radio sales and service organization with the bulk of the customers drawn from the business aircraft and private aircraft field.

At the time of its inception DARE consisted of a President, Vice President, Chief Engineer, Sales Manager, Installation Crew and Janitor. In order to fill the above positions DARE utilized two (2) employees.

During the ensuing years a close relationship was established with the end user of its services and products, namely the business pilot and private pilot. Because of this close relationship, DARE evolved a basic philosophy of high quality workmanship and high performance standards. Safety has been the underlying factor in this basic philosophy. Understanding the needs of the pilot in order to realize full utilization of his aircraft has resulted in many advances of our current productions.

It is apparent that the seeds of the desire to produce the best available

uling of the morrow's appointments.

Is it too much to hope that Mitchell will continue the development and produce an Omni-converter that will match this equipment and provide emergency navigation on VHF as well?

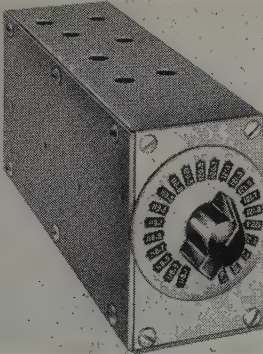
Mitchell's latest and possibly finest



contribution is their ultra-light 8-lb Air-boy Co-Pilot. As a full auto-pilot completely transistorized, it may well give stiff competition to many of its heavier, more costly predecessors.

40 DC-3's Test AiResearch Power Kit

The Garret Corporations' AiResearch Maximizer Kit, which guarantees to increase DC-3 speeds by 20 mph with no increase in horsepower, is being demonstrated on a 10,000 mi. itinerary covering 14 states. More than 40 DC-3's already have been modified with the Maximizer power section, which includes baffles, cowling and exhaust system.



Probably most well known DARE unit is the multi-channel auxiliary VHF transmitter.

equipment for the aviation industry has borne fruit for this company. From an embryonic start of two (2) employees DARE has grown to one-hundred-twenty-six (126) employees.

Mitchell Industries, Inc.

An early starter in the field of light-plane VHF navigation and communications radio, Mitchell is particularly distinguished for supplying that without which many single- and light-twin business pilots won't go cross-country, an emergency stand-by battery pack transmitter completely independent of the aircraft power system.

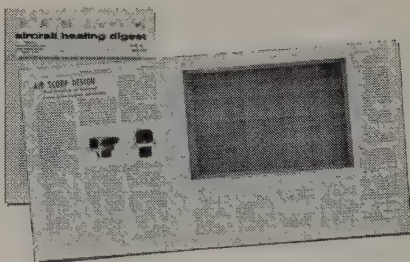
For this emergency purpose, the Air-boy Sr., with its VHF 3-channel transmitter and 200-500 kc receiver has no peer and should be considered a must for safety reasons alone. A bonus capability which may or may not get much usage, is its use as a portable unit to be taken away from the plane on overnight stops. Salesmen or business men planning the next day's itinerary can save much exasperating and frequently futile telephoning, saving that instrument for more positive sched-

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60 page catalog of Janitrol heating equipment for your plane or fleet, shows how you can add all-weather comfort. Included are standard model heaters, components and accessories, plus installation tips and engineering data. Today request on your letterhead Catalog No. 100.



Send your name and address for your free subscription to the Aircraft Heating Digest—keep up to date on the latest developments in aircraft heating, "how to" tips you can use, questions and answers on heating problems. Both the Digest and the Catalog are valuable sources of information to anyone who flies or modifies anything from a light twin up.



Your business aircraft can be as warm in winter as any airliner, because you can add the same dependable Janitrol heating equipment, designed for your type of use. For example, most light twins are Bahama-comfortable with a Janitrol S-25 heater, producing 25,000 Btu/hr, or an S-50, producing 50,000 Btu/hr.

Windshield defrosting and thermal anti-icing can be important bonuses too. Consult your modification center or write direct for full details.

Janitrol Aircraft Division
Surface Combustion Corporation
Columbus 16, Ohio



Aeronautical Communications Equipment, Co.

One of the problems confronting flying businessmen today is the increasing necessity to go "south of the border" for business. The industrial and recreational expansion in the Caribbean, Central and South American areas is tremendous. Unfortunately the communications and navigational facilities have not kept pace with our domestic developments. Despite the best efforts of our government agencies and industry and flying associations like AOPA, published VHF facilities are still generally unreliable. Hence a good proportion of such flying must be done on HF. The long range and power output of HF facilities in the above areas makes mandatory equipment made by such firms as Communications Co., Inc. (COMCO) of Coral Gables, Fla. Sunair Electronics Inc., Ft. Lauderdale, and Aero Communications Equipment, Inc., of Miami a must for "south of the border" operations. The latter offers such as:—

Model—STAR HF Receiver & ATOM HF Transmitter.

Operating on 27.5v DC, or 115v AC, this HF combination is available with dynamotor or Pack (400 cycle) power units. All units are ½ ATR rack. Receiver lists at \$1500, transmitter at \$2100. Also available is the SUN Antenna Tuner (12 lbs), 100 watts output on 2-22 mc at \$850. (Matches convent. antenna).

Lear, Inc., Learcal Division

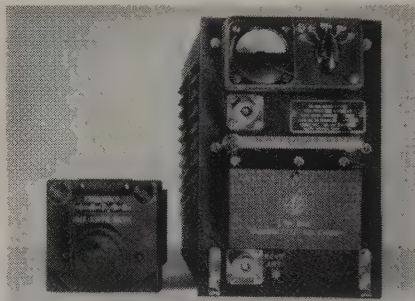
The name Lear has probably more closely paralleled the growth of business flying than any other well-known aviation electronics trade name. Starting in 1930 with some of the first quality non-airline radio equipment, Lear introduced probably the first popular low-priced light aircraft transmitter, the first multi-frequency DF covering 180-205 kc, 500-1200 and 1200-2800 kc, the self-locking hand-reel antenna (remember?), first factory-tuned multi-frequency transmitter, the famous aviation "Portable" that endeared itself to so many pre-WWII pilots, and so many more equally familiar. Having thus assured reliable communication and navigation at reasonable cost, Lear then turned to making personal and business flying safer and more practical with the first low-cost automatic pilot.

Along with these developments that greatly aided the boom in serious business flying, Lear carried on parallel development in Air Transport category equipment for military, airlines and the larger corporation aircraft. Then evidently still having time on his corporate hands, and being apparently dissatisfied with the slower progress in the development of a suitable modern executive transport to carry all his line of equipment, Bill took a war-weary Lode-star and patting and manipulating it, produced the Learstar, a 300-mph business aircraft that didn't obviously look like a war-time medium bomber in poor disguise.

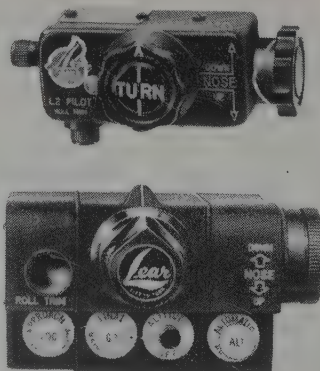
But for all the industry, and especially the young, lusty business aircraft market, the Lear trademark spells quality radio communications, navigation and flight control at moderate cost.

To highlight just some of the very complete Lear line, probably the one of most enduring popularity is the ADF series, -12 through -14, -15, to the -100, designed respectively for all classes of aircraft from the single-engine personal business up through the air transport type, and of course the entire military market.

In the VHF transmitter receiver field, Lear faces its greatest competition from the multitude of manufacturers of excellent equipment for light aircraft, as well as the heavier types. Or maybe it would be better to say the other manufacturers in this market face some of their toughest competition from Lear's broad line of communications equipment. To illustrate that Lear never rests from digging up new offshoot developments to ease pilot problems, he markets an amplifying loud speaker that plugs into any headset type radio jack, enabling a comfortable monitoring watch on ATC or other frequencies for cockpits lacking installed speakers.



In the auto-pilot field Lear could with some justification, claim to have fostered the significant switch of personal flying from the doldrums of so-called private or pleasure flying to the dynamic, and solid pattern of personal business flying. Airplanes have to fly to justify their ownership and for both the lone pilot on a business trip and the exec crew who double in brass as cabin attendants, engineer, etc., the Lear auto-pilot has made the critical difference. So reliable and well-received has been this safety and comfort device, it almost seems unfair that Lear saw fit to



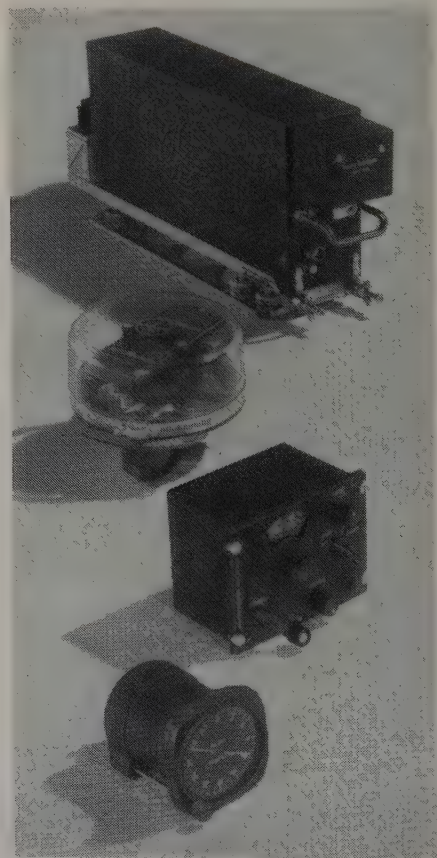
dip into the lesser field of the partial auto-pilot with the Arcon Rudder Con-

trol. It is somewhat like Tiffany featuring costume jewelry to attract Woolworth's customers.

In the flight instrumentation field the combining of attitude indications plus heading information to simplify IFR flight is well covered by the makers of air transport category equipment. Again, Lear stepped in to bring this same safety and comfort improve-



ment to the medium and light business aircraft market as well, with the NAFLI series of Natural Flight Instruments. The jet fighter needs this type of instrumentation because of the increasing importance of the attitude-recognition time factor. The business pilot needs it to both ease his work job and to make room for the next series of developments for better flight that Bill Lear is probably thinking up right this minute!



TYPICAL of Lear's avionic products for business aviation is the ADF-100, world's first fully transistorized automatic direction finder.

Collins Radio Company

One of the early users of Collins Radio equipment was Admiral Byrd, who took with him on an Antarctic expedition, a Collins transmitter which employed high level modulation, pioneered by Collins in 1933 and since accepted as a standard amplitude modulation system by the communication industry.

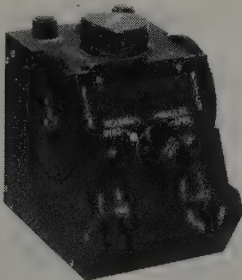
Originally developed in 1941 to tune airline ground station transmitters Collins Autotune became one of the most distinguished inventions in the radio field. Many of the types of equipment in production are direct descendants of the first automatically-tuned multi-channel radio equipment.

Linear-tuned circuits developed by Collins in 1944 had a most extraordinary effect upon communications equipment. These circuits, coupled with the Auto-positioner, another Collins development related to the Autotune, made complete electrical remote tuning a reality.

After the military, the commercial aviation industry is Collins' primary customer. Collins believes it supplies 75-80% of the communication-navigation needs of the airline industry and a large portion of the business aircraft fleets. Its intentions are to enter vigorously this latter field.

The Company's present airborne products include: 51X-1A VHF Receiver, 51X-2 VHF Receiver, 17L-6 VHF Transmitter, 17L-7 VHF Transmitter, 17L-8 VHF Transmitter, 618S HF Transceiver, 18S-4 HF Transmitter/Receiver, 456C-1 and 456A-1 SELCAL, 346A-1 Interphone and Isolation Amplifier, 346D-1 Passenger Address Amplifier, 51Z-2 Marker Beacon Receiver, 51V-3 Glide slope Receiver, 621A-1 ATC Transponder, FD-104 and FD-105 Integrated Flight System, AP-101 Automatic Flight Control System, DF-201 Automatic Direction Finder System, WP-101 Weather Radar, 344B-1 VOR/LOC Instrumentation Unit, 51R-3 Navigation Receiver, Antenna Tuners, Shockmounts, and Remote Controls.

Greatest interest has centered around the Collins AP-101 automatic flight control system. The AP-101 will precisely control aircraft in the proper



flight attitude with any mode of control desired. Operation is uncomplicated, but effective and safe. Control is effected through precision, conveniently adjusted, torque limiting clutches. Engage design permits transient free engagement and smooth "fade in" changes in control functions. Reliability is assured by the use of stable,

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CLASS IV Beech—C-18, D-18 and Super Dove Lockheed—10,12 Grumman Widgeon	\$460	\$350	35
CLASS V Douglas—DC-3 Lockheed—Lodestar Grumman Mallard Consolidated PBV	\$995	\$495	50
CLASS VI Douglas—A20, A26, B23 Lockheed—PV-1, SUPER PV Curtiss—C-46 North American—B-25 Martin—B-26	\$1295	\$495	50

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drift free magnetic amplifiers and transistors—no tubes are used. Maximum maintenance facilitation and circuit efficiency is made possible through the use of Collins modular construction. Undisturbed and concise control functions are accomplished by the use of separate control loops used in each mode of control. Incorporated as a Flight Director, the Collins Integrated Flight System provides the pilot with a continuous and complete position monitor.

With the Mode Selector in the GYRO position, command signals are induced from the PITCH and TURN knobs, and gyros (condition signals) are used to

stabilize the aircraft. Regardless of the position of the aircraft, when this mode is energized, the aircraft will assume straight and level flight. Maneuvering the aircraft is accomplished through the PITCH and TURN Knobs, and the aircraft will hold the attitude selected.

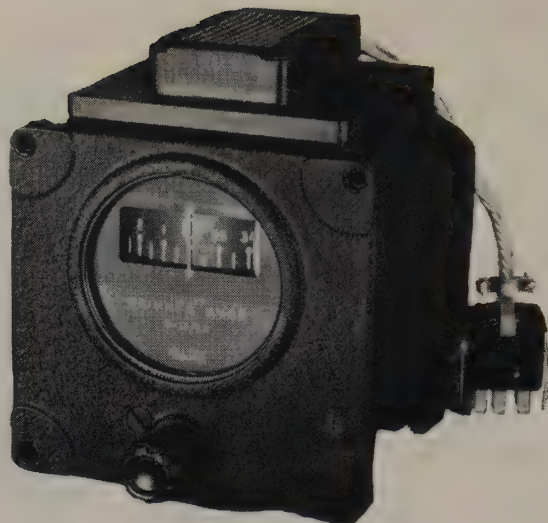
Switching to HEADING position adds the ability to change the heading of the aircraft with the Heading Knob of the Course Indicator. When the heading is changed, the aircraft will roll into a preset bank and turn to the selected heading. This maximum bank angle can be adjusted to the angle desired. The ability to fly any selected heading is particularly useful during

ONE NOT TWO

G-12/L2

NOT

G-12 and L-2



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The G-12/L2 Slaved Gyro incorporates electrical pick-offs to operate the Lear L-2 automatic pilot in any aircraft having both the CD1 and L-2 system.

The G-12/L-2 Slaved Gyro takes the place of both the standard G-12 and standard L-2 directional control in the aircraft. Simplicity of installation saves $\frac{2}{3}$ of the cost of modified units when installing new equipment.

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such maneuvers as the procedure turn.

In the NAV/LOC position, the AP-101 command information from the VOR or localizer receivers enables the pilot to fly selected omni radials or localizer interceptions. Command by the VOR or navigation inputs is disconnected when over the cone of confusion and command is by Heading alone. After passage over the cone, command is returned to the VOR or navigation inputs.

In GYRO, HEADING and NAV/LOC positions, an ALTITUDE HOLD feature may be put into operation at any time. The aircraft will automatically adjust its pitch attitude to hold the altitude at which the function was engaged. Altitude signal integration and automatic pitch trim eliminates any altitude standoff. If the pilot decides to climb or descend, rotation of the PITCH control will release the ALTITUDE switch from the Hold position.

On interception of the glideslope as indicated by the glideslope pointer, the AP-101 is switched to the APPROACH position. If the ALTITUDE HOLD function had been in use, it will release automatically. The aircraft will be guided along the glideslope and localizer path until the pilot is ready to take over for landing. Automatic glideslope integration and pitch trim are provided to eliminate any standoff from the glideslope. Cross wind correction is provided.

The Autopilot is turned on by the ON-OFF Switch. During warmup, or at any other time the Autopilot is on and not engaged, the DISENGAGE light will flash, warning of non-operation. After a warmup of about 30 seconds, the Autopilot is engaged by pressing the ENGAGE Button. Engagement is smooth and instantaneous.

The flight instrumentation system is controlled by the Autopilot Controller even when the latter is in the Off position. Functions are added in each position as described below. In the GYRO position the flight instruments indicate only heading and attitude: in HEADING, heading information is additionally fed to the steering needle; in NAV/LOC deviation is also indicated by the Course Indicator; in APPROACH, the glideslope pointer indicates relative position of the glideslope.

Input power required for aircraft having 27.5 volts DC as the primary source of supply:

Power Source	Norm.	Max. Man.
27V DC	254W	33W
115V 1ph-400cps	145VA	160VA

For aircraft having 115 volt, 3 phase delta, 400 cps as primary source of supply:

Power Source	Norm.	Max. Man.
27V DC	150W	150W
115V 3ph-400cps	110VA	190VA
115V 1ph-400cps	145VA	160VA

The limits or tolerances in the power supply are: at 27 volts DC ± 3 volts; at 115 volts 400 cycles, ± 12 volts and 360 to 440 cycles.



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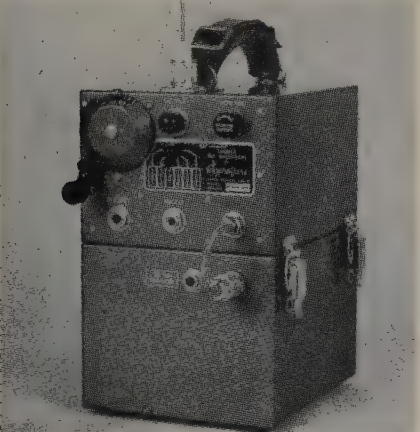
P. O. BOX 252, HUNTINGTON, N. Y.

*Trademark

Skycrafters Aviation Radio

The Skycrafters VHF MULTIPHONE is a hand-carried portable, amplitude modulated 2-way VHF Communications unit which operates on dry batteries or from an interchangeable MULTIPOWER Pack which snaps on to the T/R case in place of the Dry Battery Box.

By use of a three-way switch on the front of the MULTIPOWER Pack, the MULTIPHONE may be operated on 6 volts D.C., 12 volts D.C., or 115 volts A.C. Two power cords are supplied—one has a standard cigarette lighter



plug on the input end for plugging into the cigarette lighter receptacle in car or plane; the other is a standard A.C.

cord with pin-cap for plugging into a standard A.C. receptacle.

Standard aircraft type headsets and microphones can be used with the MULTIPHONE, since standard jacks are provided on the front panel of the T/R unit. An extra jack is provided on the front of the Battery Box and MULTIPOWER Pack which can be utilized for an extra headset connection or for attaching the plug-in type loudspeaker.

The plug-in Loudspeaker is offered as an optional accessory, since the MULTIPHONE is primarily intended for headphone operation. However, the .6 watt of audio output provides a good listening level for portable operation and relieves the fatigue associated with wearing headphones over a long period of time. The Loudspeaker plugs into all power units including the Dry Battery Pack, and is provided with an "ON-OFF" switch.

To conserve the dry batteries, the receiver mutes and no receiver current is drawn during transmission. As an added feature, both transmission and reception are accomplished on a single antenna without the use of a switching relay; thus increasing the reliability factor appreciably.

The stainless steel portable whip antenna plugs into a standard So-239 co-ax receptacle on the front of the T/R unit. When it is found desirable to use an external antenna, it can be connected by means of a co-ax line and a standard PL-259A plug.

A new type noise limiter is incorporated in the MULTIPHONE and is connected in the plate circuit of the last I.F. amplifier tube, rather than in the audio circuit in the conventional manner. Use of this type of noise limiter allows signals to be read through severe engine noise that would render the usual VHF receiver useless. Due to this feature, the VHF MULTIPHONE can be used in aircraft having unshielded engines and still provide readable signals despite noise from the engine.

BAYAIRE AVIONICS, INC.
Oakland, Calif.

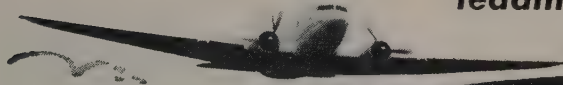
In less than four years, Bayaire has developed complete test facilities for servicing all major manufacturers' equipment. Technicians and mechanics handle radar, autopilots, flight directors and specially-designed, edge-lighted control panel installations in all types of planes.

CAA-certificated, Bayaire is the only complete facility for business aircraft north of Los Angeles and west of Denver.

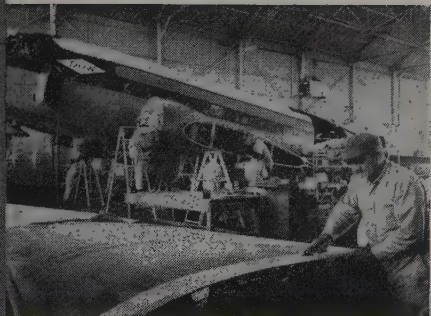
Automatic Weather Broadcasts For Two More Stations In California

Automatic weather over low frequency radio range stations are scheduled for two more California cities—Oakland this month and Fresno shortly after.

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Wilcox Electric Co., Inc.

One of the names synonymous with Air Transport Type radio equipment has been Wilcox. Wilcox has been in production and has made deliveries of its Type 714A Air Traffic Control Transponder since September 1956, far in advance of any other company in this field.

Wilcox has specialized in designing the best possible equipment with cost only a minor competitive factor. The liability and public responsibility associated with both military and air carrier flying permits no other course. Typical of Wilcox advanced engineering was their Compressor Amplifier designed well before World War II.

So, it is important and fruitful for business aviation when Wilcox enters the field with equipment designed for installation in any aircraft from the light twins on up. Such is their ADF 701 at 13.5 lbs. and other navigational equipment of airline standard.



A TYPICAL LINE-UP of Wilcox Canari equipment, from left to right, includes Type 700 ILS glidescope receiver, 701 ADF receiver, 702 marker beacon receiver, 703 Mag Cat (magnetic amplifier computing automatic tracker), 704 HF receiver, 704 modulator for HF transmitter, 704 HF transmitter, 708 public address amplifier, 709 isolation-mixing speaker amplifier and 710 isolation amplifier. Factory Canari installations have included Aero Commanders, Super 18 Beechcrafts and Convair 440's. Others to receive factory installations include DC-6B, DC-7C, DC-8, Super G Constellation, Lockheed Electra, and Fairchild F-27.

An outstanding example is the Canari (Communication and Navigation Radio Instrumentation) System, a package installation that provides all the necessary electronic facility for any professional flight operation.

Probably best known Wilcox equipment is their CAT, Computing Automatic Tracker, in use by Eastern Air



Lines for over three years which may explain their reputation for a high percentage of successfully completed very low ILS approaches.

Radio Aids

San Francisco Tower VHF/DF decommissioned on published frequencies.

Los Angeles Hi-Intensity Sequence Flashing system available on test basis at pilot's request. Flashers extend from 1200' to 300' from end of runway 25 left.

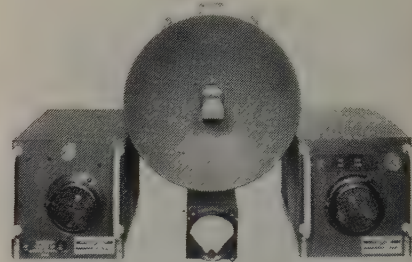
Los Angeles Tower primary Air/Ground frequency 119.9 changed to

118.9. Route traffic control outbound changed from 118.9 to 119.9.

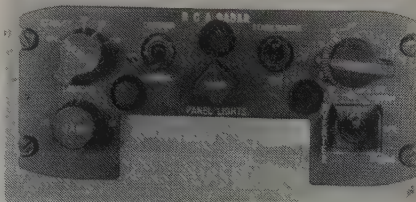
San Diego VOR shut down for modernization until 1st. of October.

Radio Corporation Of America

The Radio Corporation of America is a pioneer in the field of civilian airborne radar. Working with United Air Lines in 1952, RCA developed the first commercial C-Band radar, designated the AVQ-10. This 150-mile range equipment has been installed in many of the world's leading airlines and business aircraft. A subsequent development, more exclusively for the business aircraft market, was the AVQ-50, a fifty



pound, 80-mile range radar. This equipment has already been purchased by many business aircraft operators. Other RCA aviation products include the ATC transponder beacon for which the CAA has awarded an Evaluation contract, and marker beacon navigational aids. Latest development is a "wing-pod" radar for small military aircraft including the single-engine T-6.



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Glendale, Calif.
CHapman 5-1222

VAN NUYS DIVISION:

Van Nuys Airport
Van Nuys, Calif.
State 2-8620

CAA APPROVED

Flite-Tronics, Inc.

Flite-Tronics, Inc., Burbank, Cal., produces, among other avionic equipment for light and medium size business aircraft, a new light weight 7-channel audio isolation system amplifier. The CA-1 offers many refinements in design and operational features demanded in cockpit, pilot and co-pilot audio isolation amplification use. General features include use of one type of amplifier in any size aircraft and isolated input circuits to eliminate any need for matching to various makes of receivers. Provision is made for reception of single or mixed simultaneous voice, marker, range, or other audio signals on either one or more loud speakers or earphones. The CA-1 operates with equal efficiency in system with either high or low power dynamotor supply. It is recommended for use with high power dynamotor for high noise level cockpits and can be used with low power dynamotor supply in low noise level instances.

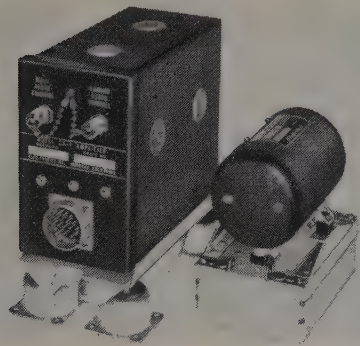
A special time delay muting of marker channel is incorporated. With this feature, pilots no longer have to turn off the audio channel of the marker receiver in order to eliminate the marker signal from interfering with return messages from the tower. Marker muting delay lasts about thirty seconds which allows enough time for communication with the tower while still releasing the marker audio to the pilot in plenty of time to catch the next marker, but does not affect visual marker indication. Muting is accomplished by pressing microphone button for transmitting. Time delay is activated on marker audio only for approximately thirty seconds after microphone button is released. Other audio remains muted only as long as microphone button is held down during transmission.

Audio output maintains balanced volume regardless of number of chan-

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Continental's Factory Re-manufacture plan, successor to the periodic overhaul, backs you with the specialized skills of the men who know your engine best. With your factory re-manufactured Continental, you get new engine warranty—new log book with zero hours—at a modest, pre-determined price. Most important of all, you're back in the air with an absolute minimum of costly down time.



nels put in use. The CA-1 audio amplifier has the same case dimensions, shock mounting and basic appearance of the Flite-Tronics MB-3. Complete cockpit isolation between pilot and co-pilot is accomplished by using two CA-1 amplifiers.

Flite-Tronics CA-1 audio amplifier specifications are as follows:
WEIGHT—Approx. 3¼ lbs.
MOUNTING DIMENSIONS — Receiver, 7½" high by 4¼" wide by 7½" deep with shock-mount.

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FOR THE INFORMATION
THAT CAN SAVE YOU
TIME AND MONEY WHEN
OVERHAUL TIME ROLLS
ROUND AGAIN?

WHEN CHOOSING AN
AIRPLANE, FOR PER-
SONAL OR BUSINESS
USE, MAKE SURE IT
HAS CONTINENTAL
ENGINE . . . PILOTS'
UNDISPUTED FIRST
CHOICE.

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION
MUSKEGON, MICHIGAN

Dynamotor, 5" high by 5¼" wide by 3½" deep.

POWER CONSUMPTION—Filaments — .45 Amp at 24 volts, 9 Amp at 12 volts. Plate — 2 Ranges, Hi = 50 Ma. at 285 volts (separate dynamotor), Lo = 35 Ma. at 250 volts used as companion to MB-3)

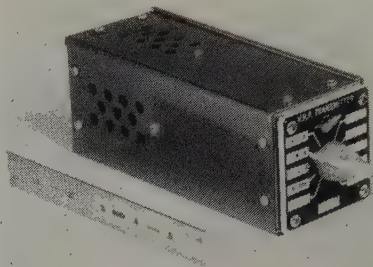
Aeronautical Electronics, Inc. (Aerotron)

Started not too long after WWII, in a small ex-hangar building on the back-side of the Raleigh Airport, AEROTRON is the brainchild of Charles R. Browning. He took a long look at the early post-war radio offerings for personal aircraft and decided that they could be built better, more reliable yet smaller. With an unusual appreciation of the small owner's problem of amortizing already installed but inadequate radio, Charley came up with the miniature extra multi-frequency transmitter "can" that literally fits into an ash-tray size panel opening. Especially valuable in adding the new additional frequencies required today, Aerotron saved thousands of 5-channel units from the garbage dump and endeared themselves to small personal business pilots everywhere. A few of their line are described below:—

Model 200-A

This 0.5 lbs transmitter operates on

12-14 volts DC with an output of 1.5-3.0 watts. Ten available channels will cover a 4-mc range. (121.5; 121.9; 122.1; 122.5; 122.7 and 122.8 are standard supply plus any other 4 within the above range.) Mounts in any 2.25-in. instrument hole and lists at \$79.50 with the basic 6 crystals.



Model 200-B Same as above, except: 10 crystals supplied, 118.1-119.9. List \$99.50. **Model 200-C** Same as above, except: any 10 crystals in 4 mc spread to 150 mc. List \$119.50.

Model 500-A Transceiver

Weighing 15 lbs, this portable 2-way radio operates on 6, 12 or 115v, power 1.5 to 10 watts depending on usage. Fixed tuning on one crystal frequency, it is designed for airport, Civil Defense or industrial use and lists for \$279.50 in all models.

Jeppesen Story Told

Reported to be the only firm of its kind in the world, Jeppesen & Co. was started in 1929 when an air mail pilot found the way to fill an urgent need for accurate, dependable flight information.

E. B. Jeppesen, a Boeing Air Transport pilot, recognized the need for the collection and organization of flight data, and started recording it in a notebook, which eventually contained all sorts of comments, sketches, figures, and charts for dealing with the hazards and "unknowns" of flying in the struggling days of the aviation industry.

Word soon got around and pilots began asking for copies of Jeppesen's material. The demand grew so great that in 1934 Jeppesen formed his own company to gather, publish, and distribute this flight data under the trade name *Airway Manual*.

The *Manual* was so successful that Jeppesen moved to Denver in 1941 and established permanent offices and production facilities at Stapleton Airfield, Denver, in 1946.

The company subsequently added the *Radio Air-Route Guide*, the radio navigation flight manual; the *R-2 Computers*, for figuring flying problems from sea level to 80,000 feet; and a wide range of essential navigation aids and flight manuals.

Jeppesen & Co. is also known for its *Natural Color Relief Maps*, used by business, industry, commercial air carriers, publishers, and schools. Jeppesen maps are produced to meet specific requirements for each customer.

With the opening in May 1957 of Jeppesen, GmbH, in Frankfurt, West Germany—to supply European aviation with a special European *Airway Manual*—Jeppesen & Co. became international in character. Expansion of plants and services to Central and South America, the Pacific, and Australia is scheduled.

concentration on aviation

Originally created to fill your need for experienced pilots exclusively, now prepared to also serve as your "prime source" for ground and administrative specialists . . . supplying top-notch personnel, pre-screened to save your time . . . this is the contribution P. E. A. is proud to make to the aviation industry.

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FEDERAL SKI & ENGINEERING CORP. Minneapolis, Minn.

Established in 1925, Federal Ski & Engineering Corp. are the pioneers in the design and construction of aircraft skis for all makes of aircraft adaptable to skis, from the smallest pleasure craft up to cargo carriers.

Most popular is the multi-purpose ski that permits landings or take-offs on either dry runways with the wheels in down position or on snow with the skis in down position. The skis are hydraulically controlled from the cockpit.

Taxi Ways Can Be Clearly Marked

Have heard that Green Airport, Providence, R. I., has the taxi strips clearly marked. Some enterprising airport design genius painted empty beer cans with luminescent blue, attached them to sticks and stacked them into the ground. They are as beautiful as any marked runway, require no maintenance or electricity, and pilots seem to be very capable in finding their way among beer cans.

National Aeronautical Corp.

Narco is a household word with so many pilots of personal and light business aircraft that a description of the rise of this company is redundant. Suffice it to say that Narco pioneered in the post-war light aircraft radio field so successfully that today personal aviation, whether for pleasure or business, is so completely radio-equipped that government and industry planners can speak of virtually banning non-radio aircraft in many sections of the country without hearing even a ripple of complaint.

With good radio communications and navigation so easily and financially available, who would fly without it? Even primary flight training schools, agricultural and other industrial operators find radio contact with and control



of their flying equipment so vital, it is hard to find an operator without it. And as each fledgling pilot, whether learning for business or pleasure, contemplates practical use and enjoyment of his new skill and property, the need for good radio is so obvious, the smarter schools have seen fit to incorporate radio handling techniques with their flight curricula.

So it is only natural that Narco is a by-word as thousands more every year enter into personal and business flying.

Along with offering reliable radio at minimum cost, Narco was the first to effectively resolve the dilemma of the critical tuning of VHF receivers. Crystal tuning and auto-selection costs money, much more than Narco's prime market could afford and yet, easy accurate tuning rapidly progressed from a minor convenience to a vital safety must. Also, very quickly, the demands of entry into many hi-density terminal airports further accentuated this need.

So Narco developed their "Whistle-Stop" tuning device whereby the pilot could assure proper alignment of his tunable VHF receiver prior to calling a busy terminal.

Through no fault of Narco, their government-backed foray into DME airborne equipment was aborted by forces in combination greater than the civil unsubsidized market. The distance measuring capability for other than military and airline users will now have to wait until Narco or similar producers see their way clear to risking company capital to provide TACAN "for the masses." Be assured that a truly "low

cost" TACAN for the personal pilot or small business twin will probably not be forthcoming until a firm like Narco produces it.

It is gratifying that it can be reported that Narco's Sapphire line of high-quality and somewhat more expensive radio equipment is slowly but surely edging into the larger aircraft market. This detracts nothing from the excellent products of the firms who have had that market as their private hunting preserve. It simply means that they will work harder to hold their technical and developmental lead with resultant benefit to the steadily increasing number of users of business aircraft.



CONTINENTAL MOTORS' guiding hands are those of C. J. Reese, president, and D. H. Hollowell, vice-president in charge of aircraft engine sales.



*for the finest in business-pilot training
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● It's only natural that Embry-Riddle, America's pioneering, best known school of aviation, trains outstanding business pilots.

The two-year Business-Pilot course offered in conjunction with the University of Miami, fully qualifies the Embry-Riddle graduate for his choice of aviation's most responsible positions—both on the ground and in the air.

Whether a beginner or a commercial pilot seeking higher ratings, the complete, well rounded curriculum provides the broadest possible background in a wide range of technical aviation phases ...plus basic business and management education necessary to success in any management or aviation executive career.

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range flying conditions which will be encountered by the corporately employed pilot. Experienced instructors, modern aircraft, advanced Link trainer equipment, and latest instruction methods insure the best qualification for each student.

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Embry-Riddle Aeronautical Institute, Miami 30, Fla.

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Address _____

City _____ State _____

(for students only) age _____ (check one) vet ☐ non-vet ☐

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Dallas Airmotive's Island Service Division, located on the Municipal Airport in Galveston, Texas, is the ideal service organization for all airplanes operated in the Americas. The Island Service Division is especially ideally situated for those who operate executive, business and private aircraft in the Gulf Coast area.

At the Island Service Division, Dallas Airmotive provides modification for all types of aircraft; custom luxury interiors; aircraft painting; radio-electronics-navigation sales and installation; transient service; overhaul for fixed and rotary wing aircraft; storage; accessory sales, installation and overhaul.

In Dallas, Dallas Airmotive will continue to provide the finest in engine overhaul facilities and services.

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The Associated Radio Story

Associated Radio is one of those rare business entities conceived out of purpose rather than payroll. In June 1948, Associated Radio was plotted and put on paper in the old Goode-Foster Building next to Hangar #1, Love Field, Dallas, Texas. It was a three-way partnership.

Carl Fox was no newcomer, having been a radio operator as far back as 1923. He entered the specialized aircraft radio field shortly after 1932. In 1943, Carl met up with Lee Lanford while working closely with the Air Force at Wright Patterson Field in various communications and radar projects.

Later Lee Lanford worked with Carl in the radio department of Southwest Airmotive at Dallas. Already working there was Tony Aguilar, who had served as a radio/radar maintenance man in the states and overseas. The three worked side-by-side until they made the joint decision to form a company devoted primarily to serve the needs of the business aircraft field.

Their first employee, Richard L. Smith, present Shop Supervisor, came to work with the full knowledge that it might be a long time before minimum salary requirements might be met!

Today they stand as a two-fold corporation. Corporation number one is Associated Radio Company, Inc., to stock and market products of the major manufacturers of aircraft electronic products.

Some of the lines represented are Collins Radio, ARC, RCA, Flite-Tronics, Dare, Sun Air and Sperry. In several lines, they have exclusive territories; for example, RCA in Texas, Louisiana, Mississippi, Arkansas, Oklahoma, New Mexico, Kansas and Colorado.

The second and possibly the foremost corporation is Associated Radio Service Company. This comprises the major bulk of employees who function as advisers and installation engineers of radio, auto-pilot and radar equipment on all types of business and commercial aircraft.

The installation of auto-pilots in business aircraft is one to which Associated points with pride, having gained much public acclaim for their excellent

engineering, such as in the Delhi-Taylor Oil Company DC-3, N7L, flown by Don Beeler. The Collins AP-101 (see cut) installation is unique in N7L, in that all gas being stored in the wings, the entire center section is available for installation of radio equipment, under the floor and out of the way, but exceptionally accessible to maintenance servicing. The area that normally holds radio in the DC-3 was thus left available for more equipment and storage space.

Associated Radio owns and operates a Cessna 180 for the varied uses of their employee-specialists. The corporation is presently geared to make installations on any and all types of aircraft. It installed the custom radio and auto-pilot equipment in the Fairways Corporation Convair 440, piloted by George Young who helped design the installation, and rated the number one equipped airplane at the 1957 Reading Business Aircraft Show.

Associated also made the first Collins Integrated Flight System installation in a business airplane. Their technical personnel attend all the available industry service training schools such as Collins, Narco DME and Sapphire Schools, Sperry Gyro School and lately schools in RCA Weather Radar. Associated is currently planning to expand their service facilities.



PIONEER CENTRAL division of Bendix Aviation Corp. occupies two separate plant facilities for the manufacture and assembly of precision equipment.

Total of almost 250,000 sq. ft. of floor space covers less than 20 of the total area of 47 acres held at Davenport, Iowa, shown above.

Plant one (center) is devoted to management, engineering, fabrication and assembly of aircraft instruments.

Plant two (upper) since 1956 has housed all facilities for the development, manufacture and sales of ultrasonic equipment, as well as production of vacuum insulated containers for liquid oxygen systems.



DELHI OIL CO. DC-3 showing the RCA Weather Radar position from which the course can be controlled by manipulating the knob on the Collins Course Indicator.

Marin County Airport Site Selected

After considerable study and debate over two possible sites for a Marin County Airport site, the County Supervisors selected 50 acres of tidal land on the north side of San Quentin Point and it will provide, according to plans, a 3000 foot runway.

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MORE COMFORTABLE FLIGHTS IN YOUR...**



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TWIN BONANZA



**BEECHCRAFT
SUPER-18**



CESSNA 620

...or other aircraft
where space, weight
and power are at a
premium!

RCA WEATHER AVOIDANCE RADAR (AVQ-50)



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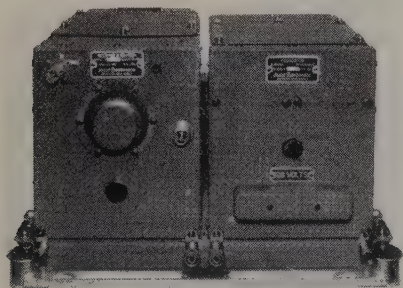
11819 W. OLYMPIC BLVD.

LOS ANGELES, CAL.

Aircraft Radio Corp. CD-1 Course Director

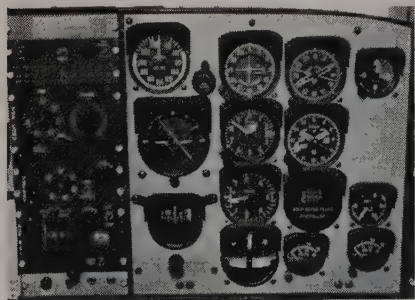
For use with VOR equipment to make VOR and ILS approaches by reference to the vertical needle of the standard crosspointer meter, this instrument "interpolates" for the pilot, greatly simplifying "turning on" and "tying down," the most difficult job on instruments. Weighing 10 lbs and operating on 14v & 28v, it lists at \$2226.

Type 15D Omni-Localizer Receiver
The basic navigation/communication receiver, the Type 15 operates through the 108-135 mc band on 14v & 28v. Versatile, it is used for VOR enroute and approach problems, VAR and ILS Localizer approaches. Combined with *Type T-11B VHF Transmitter*, including supplementary channel crystal adaptors installed, and a *K-13 Oscilla-*



tor-Relay to provide crystal-accurate free tuning, this package represents an ideal all VHF combination for light business aircraft. Instrumentation has been combined to conserve space and permit dualization. Combined weight in the neighborhood of 30 lbs. List for the basic 15D is \$2183.

ARC also makes the outstanding lightweight *Type 21 ADF* (under 20 lbs); *Isolation (F-11A)*, *Audio (F-13A)* and



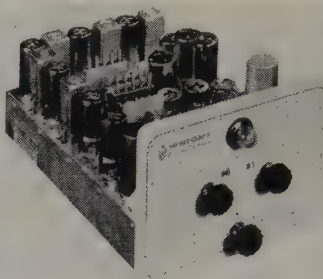
Co-pilot instrumentation in the ARC Twin-Bonanza shows the very complete communications and selector panel on left. Of especial interest is the CD-1 Course Director (second down, second row from right). Ease of operation from either seat without customary cross interference between pilots is featured. Pilot-engineer Christiansen uses plane to demonstrate ARC's line.

Interphone (F-15) amplifiers; VHF and LF Communications receivers; Marker Beacon (R-20A) receiver; VHF and UHF Transmitter; standard and non-standard (low-belly, anti-icing) antennas; signal generators (H-14A) and a portable VHF Communicator package (Type 12).

Wright Airborne Electronics

Appropriately named THE EXECUTIVE "60", a new transceiver announced by Wright Airborne Electronics, Kansas City, Mo., sells for less than \$600. A long-range communications unit of multi-channel construction with strong output, it incorporates crystal-controlled reception as well as transmission, while holding weight to a negligible factor. The new Wright unit is dynamotor-powered. The planned price will include all crystals, antenna, power supply and cables.

Wright points out that the circuit design of THE EXECUTIVE "60" elim-



inates many trouble spots formerly found in VHF equipment. Also, the use of crystal-saver circuits enables the set to give 60 channels of transmission and reception with the use of only 22 crystals. "Since the receiver is also crystal-controlled, there is no 'hunting' needed, no squealing crystal tuners; just select the desired frequency and the set is locked on. The dynamotor power supply insures a dependable, stable source of power at all times," he explained.

Also available is an all-new Localizer Adapter, the WLA-10, which can be added to your present VHF receiver. Now coming out is an ADF; a lightweight, three-light marker beacon receiver, dynamotor powered; and many others.

Navigation To Be Changed By Radar Maps

A device called a radar strip recorder which shows a photograph of the ground beneath the aircraft as seen by airborne radar eyes, will make navigation a matter of pinpoint accuracy.

According to the Hycon Manufacturing Company, pilots will be able to consult a map that is only twenty seconds old, made day or night in flight by radar. The radar strip recorder is a device of high-precision optics and advanced electronic techniques. The optical system includes mechanical adjustments which enable the pilot to correct the machine for wind drift. This correction will result in a rectilinear record which maps the ground accurately along perpendicular axes, regardless of wind at high altitudes.

It will work equally well at day or night, above clouds or in the clear. If the radar flight recorder lives up to its billing, it will revolutionize air navigation by combining the accuracies of radar, the convenience and utility of photography and the speed of electronics.

QUALITRON, INCORPORATED Burbank, Calif.

Qualitron, Incorporated was organized April 19, 1946 as an aircraft radio sales and service operation to cater primarily to the executive aircraft field.

Relocating at Lockheed Air Terminal, Burbank, in October 1948, associated Qualitron with Pacific Airmotive Corp., Aero Interiors, and Aircraft Tank Service to form a nucleus of independent organizations capable of offering collectively a well-rounded, complete airframe overhaul center to better serve the growing list of corporate executive aircraft.

Qualitron operations are limited to specialized custom executive aircraft radio communication, navigation and radar systems. These services to the executive aircraft trade are provided: equipment and material sales, engineering and installation of aircraft radio communication, navigation and radar systems, overhaul of all types of aircraft radio navigation and communication equipment, manufacture and design of custom-built radio control panels, relay racks, circuit breaker panels, junction boxes, wiring cables, and associated radio system units.

Log of Qualitron clientele contains such names as: Murray Corp. of America, Richfield Oil, Union Oil of Calif., Allegheny-Ludlum Steel, Pittsburgh Consolidation Coal, National Supply, Bethlehem Steel, Mellon National Bank, Potlatch Forests, Jones & Laughlin Steel, Sears, Roebuck and Co., National Supply, Sunray Mid-Continent Oil, Mesta Machine, Signal Oil & Gas, Columbia-Geneva Steel Div. U. S. Steel, Transcontinental Gas Pipeline, Imperial Oil, Royalite Oil, Pacific Petroleum, Edwin W. Pauley, Nevada Natural Gas, Philip K. Wrigley, Dan Peterkin, Jr.

The company serves as dealer-distributor-service agents for: Aircraft Radio Corp., Bendix Radio, Collins Radio, Dayton Aviation Radio (DARE), Sperry Gyroscope, NARCO, Flitronics and others.

Facilities and test equipment are maintained by Qualitron for servicing and overhaul of aircraft radio communication and navigation equipment of all types. A considerable portion of the company's gross volume of business is through service work alone. As new developments occur in the aircraft radio industry, Qualitron either procures or builds test equipment in order to offer a complete service operation. The Company hand-picks personnel for every phase of operations. These combined facts were instrumental in Qualitron's receiving the first-issued CAA Certified Radio Repair Certificate in the Western District.

Electra Engine Tests Begun

Fish Salmon was at the controls of a specially-modified Super Connie when it was taken aloft under the power of 4 Electra prop-jet power plants for the start of a 1000-hr. endurance flying program.

The test program for the Electra's engines, Allison 501's with Aeroproducts props, will parallel airline schedules with brief airport stopovers sandwiched between flights of various ranges. The program is part of a study aimed at running up about half-a-million engine-prop hours on Lockheed's new short-to-medium-range airliner before the first commercial delivery in the fall of 1958. More than 60,000 hrs. have been logged to date.

**Unipak Aviation Corp. Acquires
Wholesale Aircraft Parts Co.**

Unipak Aviation Corp., L. I. City, N.Y., acquired the assets of Wholesale Aircraft Parts Co. of Whitestone, N.Y. on an exchange-for-stock basis.

Mr. Robert Miller, principal of the latter firm, will serve with Unipak in a general executive capacity. S. L. Mantell of Scarsdale, N.Y., is president of Unipak, leading supplier of Aircraft parts and services to corporate air-fleet owners and airlines, domestic and foreign.

Point of Law

A recent decision by Judge Robert E. Roberts, in Los Angeles, has clarified the issue of whether airport owners and operators can or cannot be held responsible for the noise and damage created by aircraft taking off and landing, when he denied the damages to plaintiffs who attempted to sue the City of Los Angeles recently. The judge noted that airport owners and operators are merely "housekeepers," and have no direct regulatory powers over aircraft.

**Aerial Camera Equipment Rental
Service—West Coast Innovation**

Everything the aerial cameraman needs for mapping, reconnaissance, and photogrammetry—except the aircraft itself—is now available on a low-cost rental basis from Gordon Enterprises, North Hollywood, Calif., camera manufacturer.

All types of aerial mapping, aerial recon cameras, film magazines, camera mounts, intervalometers, processing machines, printers, dryers, and other aerial camera accessories and lab equipment are available. Rental can be arranged by the day, week, month, or on a long-term lease basis.

Among the stock aerial cameras is the S-7, applicable to pipeline surveys, highway route mapping, or any low-level, highspeed aerial work; and the famous Air Force Series "k" cameras, as well as the F-56, a precision camera for vertical mapping and oblique photos.

Three Jobs Keep 182 Busy

Santa Monica, Calif. Industrial Asphalt's company pilot, Wallace E. Hunt, has a new job for his Cessna 182.

The company will use the plane to curb air pollution at the 26 plants it operates in the smog-suffering Los Angeles area. The plane will also play a big role in improving communications within the firm's network. In addition, the 182 will be used to survey new plant sites from the air, and to check the progress of paving jobs.

The airplane is equipped with full instrument panel including ILS, Omni, ADF and air-to-ground communications with all company vehicles, offices and each of the 26 plants. Hunt is a former Air Force jet pilot who also serves as director of public relations.

D-18 OWNERS

Fly with GREATER SAFETY with

Beechcraft "WET WING" Conversion



Elimination of nose tank gives added baggage space and increased safety. Installation of "WET WING" outboard of engine nacelles makes it possible to carry an additional 100 gallons in each wing, providing for a more desirable load distribution. Overall weight is increased by only 25 lbs. Fuel pump system installed at request of customer.

CAA approved Conversion.

For more information and list of satisfied customers . . . Call or Write



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Manufacturers of stainless steel wire . . . a wire with a combination of worthwhile characteristics, namely; corrosion resistance, heat resistance, non-magnetic, strength, hardness, and ease of fabrication. Ideal for use as locking wire and for the manufacture of aircraft cables in commercial and military aircraft.

Write or phone for additional information, or request the assistance of our representative in your specific problems.



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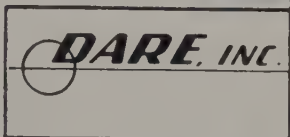
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NBAA reports that during the period July 5 to July 25. FCC authorized the first 11 Aeronautical Advisory Stations on the Unicom frequency 123.0. The stations are listed below.

Location	Airport	Licensee
(1) Austin, Texas	Austin Mun. Airport	Ragsdale Flying Svc.
(2) Baton Rouge, La.	Ryan Airport	Hair Flying Svc.
(3) Casper, Wyoming	Casper Air Terminal	Casper Air Svc., Inc.
(4) Charlotte, North Carolina	Douglas Mun. Airport	Cannon Aircraft Sales, Svc.
(5) Chicago, Illinois	Meigs Airport	Lake Air Svc., Inc.
(6) Dallas, Texas	Love Field Airport	Associated Radio Svc. Co.
(7) Little Rock, Arkansas	Adams Field	Central Flying Svc.
(8) Memphis, Tennessee	Municipal Airport	Dixie Air Associates
(9) Sacramento, California	Municipal Airport	Patterson Aircraft Co.
(10) San Antonio, Texas	San Antonio International Airport	Howard Aero, Inc.
(11) Yakima, Washington	Yakima Mun. Airport	F. O. Schweitzer Aircraft

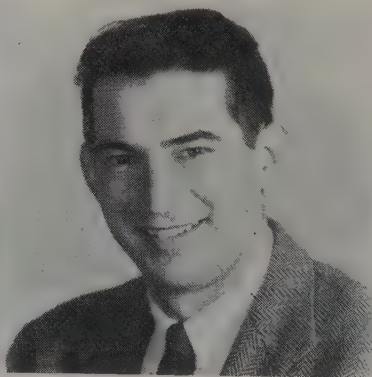
MCCAULEY INDUSTRIAL CORPORATION

Dayton, Ohio

Expecting a boom in private flying following WW II, McCauley converted from the manufacture of steel to aluminum propellers and introduced its "Met-L-Prop," a low-cost fixed-pitch propeller.

When new air foil designs were later developed, McCauley was on its way to becoming the world's largest manufacturer of metal propellers for business and pleasure aircraft. More than 75,000 props have been made by the company.

From the early fixed-pitch prop, McCauley today manufactures both the fixed-pitch and constant-speed props for engines from 65 to 265 horsepower.



Nearly 150 specialists are employed in the 60,000 square-foot Dayton plant. Founded by E. G. McCauley, now honorary chairman, the plant is managed by *Vernon W. Deinzer*, vice president and general manager since 1955.

Miss Business Aviation 1957

A new Miss Business Aviation 1957 will be the official hostess at the 10th annual NBAA meeting and forum in Denver, Oct. 2-4.

Deadline of Sept. 7 has been set for entries from NBAA member companies.

Last year's Miss Business Aviation was Miss Pat Ward of Delta Drilling Co., Tyler, Texas.

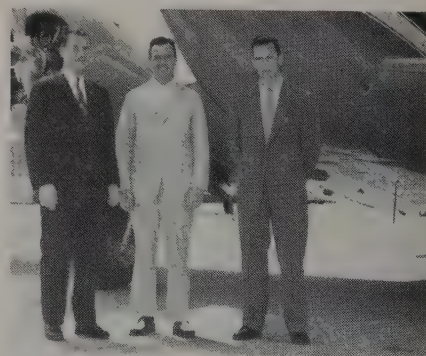
Cessna Exhibits at N.B.A.A.

Cessna Aircraft Co. will exhibit three of its commercial airplanes at the National Business Aircraft Association convention in Denver, Oct. 2-4.

Models to be exhibited will include the single-engine Model 172 and 182, as well as the new 1958 Model 310B. A new interior cabin mock-up of the company's four-engine Model 620 will also be shown.

The exhibit will be located on the "Cessna Plaza," which is the upper plaza in Denver's Mile High Center. The display will include Booths 401 through 408. Personnel will be on hand throughout the convention to answer questions about the Cessna line of aircraft.

Cessna executives attending the convention will include Dwane L. Wallace, president; Del Roskam, vice-president and general manager, commercial aircraft division; Frank D. Martin, marketing manager; and T. Guy Miller, 620 sales manager.



300TH Beechcraft Super 18, purchased by Krispy-Kreme Doughnut Corp., Winston-Salem, N.C. Shown above (l to r) are V. C. Rudolph, Krispy-Kreme Pres., R. S. Northington, V-P of Piedmont Aviation, Inc., and company pilot Rex Beamer, with the new plane. First Super 18 was built in 1954.

DuPont Puts Color in the Skies For Business Aircraft

The quicksilver progress of business aviation has opened up a whole new field for automotive enamels. Applied to business and personal aircraft, DuPont Dulux enamels protect aircraft against corrosion, make them easy to keep clean, and give them a distinctive exterior as individualistic as the customer desires.

Refinishing of private planes is becoming big business. For example, Yingling Aircraft, located near the Cessna factory in Wichita, has steady business in refinishing aircraft operated by oil and lumber companies, manufacturers and individual owners.

The market value of used aircraft receives a big boost when the plane is refinished properly. At Springfield, Ill., John and Bob Brandis are making a name for themselves in aircraft refinishing, completing from 12 to 14 Dulux enamel jobs each month, ranging from single-engine planes to big executive models.

SKYCRAFT DESIGN

Langhorne, Pa.

In 1954, Albert Snyder gave up commercial flying and opened a development and manufacturing concern which specializes in complete Alclad conversions—not kits.

"Private pilots everywhere were becoming interested in metal conversions," he recalls, "but they were looking for a high quality product combined with real economy. In 1954 there didn't seem to be much chance of getting both."

However, through volume-production Skycraft Design has gained economy, without losing custom quality. An average of five conversions a week come off the specially-tooled production line. Currently, there are some 50 conversion projects in varying stages of development. Wing and fuselage conversions are all CAA ST-certificated. With anticipated sales for 1957 four times those of 1954, Snyder reports that facilities at Old Star airport will soon be doubled.

Director's Notes

(Continued from page 6)

mination and an engineer's know-how saved the taxpayer some millions of dollars.

As related by SAC headquarters, a B-47 preparing to touch down found that they had landing gear trouble. Low on fuel . . . the B-47 circled overhead while a refueling plane was dispatched aloft. Fuel to sustain the B-47 was transferred as, on the ground, engineering officers pored through Boeing maintenance manuals trying to solve the gear trouble.

After hours of suggestions, after hours of frustrating attempt to get the gear down, a phone call to the Boeing factory produced an engineer with the answer.

The gear was successfully lowered and the B-47 landed and rolled to a stop.

The total number of hours aloft was not mentioned . . . but the B-47 was refueled *eight times* between the time of initial approach and final landing!

INDUSTRIAL X-RAY, INC. New Hyde Park, N. Y.

Non-flying time and labor costs have been reduced by the use of this visual



form of plane inspection. A new development in maintenance, this radiographic mobile unit can be run out on the field and put into operation right away. An independent testing laboratory organized in 1951, Industrial X-Ray has recently been approved as a CAA repair station.

Airotary Supply Co. Inc.

E. D. MORENO, Gen. Mgr. of Airotary Supply Co., with ten years' experience in the field of electronics, and L. Muehlenkamp, as chief of production, set up Airotary Supply Co., Inc. in Burbank in Nov. 1955.

Among airlines, fixed base and airport operators, Airotary Supply is known for the sale, maintenance, overhaul and repair of inverters, dynamotors and alternators.

Within about a year after setting up shop, Airotary won the coveted Air Agency Certificate, and approval of the Air Force and Navy as a source inspection plant.

In June 1957, the company moved from Burbank to its own greatly enlarged plant at Sun Valley, Cal. This move was quickly followed by the installation of \$10,000 worth of equipment specifically designed to service inverters, dynamotors and alternators. This battery of test, overhaul and finishing equipment enables Airotary Supply to bring overhauled units to a final check with a minimum of time and error. The savings of time and labor means lower costs to customers.

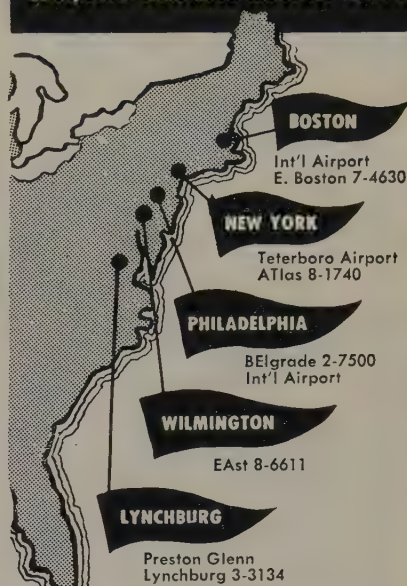
One section of the Airotary plant has been marked "off limits" and set aside for the armed forces as a storage area for government inverters and related equipment awaiting repair or overhaul.

STEWART AIR PARK Parkersburg, W. Va.

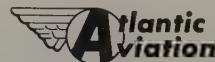
Operated by Executive Airmotive, Stewart Air Park is one of the few places where air, interstate highway, rail and river barge traffic meet within such a small area. Facilities offered for the flying businessman include a restaurant, motel, pilots' lounge, visitors' lobby, shops, storerooms, administration offices and aircraft storage hangars.

Piper distributor for West Virginia, southern Ohio, and western Maryland, Stewart Air also operates a Piper certified service center. Other aircraft services include major airframe and engine maintenance, tie-down facilities, flight training and air taxi. The 3,300-foot long landing area accommodates aircraft up to DC-3 size.

WHEN NORTHEAST SEE ATLANTIC complete business aircraft service



thirty years of growth . . . modern equipment . . . hundreds of trained technicians . . . expert leadership . . . and a persistent demand for the best . . . that's why hundreds of business aircraft — Cubs and Bonanzas to DC-3's and Conquairs — return to Atlantic for the next jobs.



complete one-stop service . . . substitute aircraft, if desired . . . major maintenance facilities and shops (heavy and light aircraft) at Teterboro, Philadelphia and Wilmington . . . up to light twins at other divisions.



Custom installations . . . radio and electronics . . . custom painting . . . our shops and technicians among the tops in the nation.



one of the largest business aviation parts inventories in the industry . . . includes DC-3 and Lodestar parts.

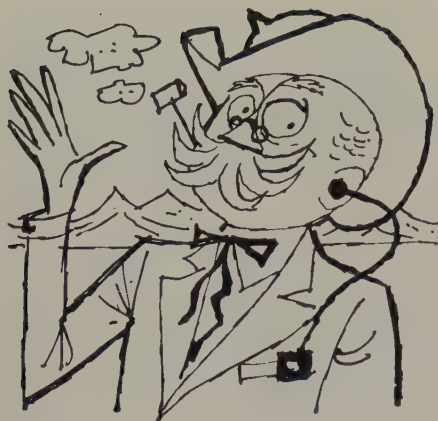


Beechcraft sales and service . . . used aircraft sales . . . leasing . . . rental.



every business aviation service.

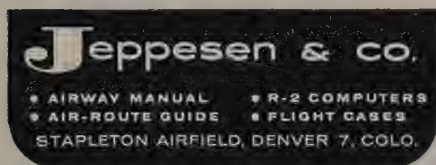
BOSTON
International Airport, E. Boston 7-4630
NEW YORK
Teterboro Airport, N.J. Atlas 8-1740
PHILADELPHIA
International Airport, BEIgrade 2-7500
WILMINGTON
New Castle County Airport, EAs 8-6611
DuPont Airport
LYNCHBURG
Preston Glenn Airport, Lynchburg 3-3134



Cap'n Sharp Says:

"Howdy, Business Pilots!"

"The folks at Jeppesen welcome you to Denver and the 10th Annual NBAA Forum. I'll be lookin' for you in the Mile High City, October 2-3-4!"



- Available for either cycling combustion heaters or proportioning exhaust and ram air.
- Maintain constant selected cabin temperature.
- Easily installed. No shielded wiring, vacuum tubes, or mercury thermometer.
- Widely used on DC-3's, Lodestars, Mallards, A-26's, PV's, B-23's, Aero Commanders, and other executive planes.

WRITE FOR LITERATURE



Aircraft Controls

BARBER-COLEMAN COMPANY
Dept. U, 1429 Rock Street Rockford, Illinois

ADDISON AIRPORT, INC. Dallas, Texas

A \$2,291,000 business flying center, Addison began operation this summer on its 400-acre tract 13 miles from Dallas. Its facilities include a 4,500-foot asphaltic concrete runway; 5,000 square-foot terminal building; six hangars, including two with 26,000 square feet of floor space; 150 T-hangars, TVOR radio facility and night-lighting. Land is available so the main runway can be lengthened and additional hangars built.

DALLAS AERO SERVICE, INC. Dallas, Texas

One of the nation's pioneer aviation concerns, Dallas Aero Service offers every phase of fixed-base service and facility. Operating from four large hangers and an administration building, DAS provides engine overhaul, accessory sales and overhaul, complete radio and electronics products, aircraft repair, overhaul and modification, hangar storage, instrument sales and overhaul, tank-sealing service and line service.

Among its special services is a modification program for the Lockheed Lodestar that increases speed up to 30 m.p.h. This program was given a supplemental type certificate from the CAA. One of seven authorized Wright engine overhaul installations in the U.S., DAS specializes in the 1820, and is the only factory-authorized engine-overhaul agency for the Gypsy Queen engine as used on the de Havilland Dove.

An important feature of the DAS operation is its radio, navigation, communica-



tions, electronics, radar shops. Staffed by some 15 electronics technicians, this division occupies 2,000 square feet of air-conditioned floor space. Among the shop facilities are three individual screen rooms for testing all types and makes of air communications and navigation equipment.

DAS total 1956 sales of \$2 million represent an increase of more than 42 percent over 1955. Sales for 1957 are estimated at \$2,500,000 as compared to \$800,000 for 1954. The 1957 employees' payroll for 212 persons is estimated at \$1,035,000.

White Sidewalls for Aircraft

William O'Neil, president of General Tire and Rubber Co., Akron, O., said that the idea of white sidewalls is beginning to hit the business executive flying industry.

It is standard equipment on the executive version of the Fairchild F-27, and, it is expected, the white sidewalls will become popular for other business aircraft.

GE's "Precision Plus" Manufacturing Idea Dates from 1931

"Precision Plus" is General Electric's description of its aircraft instrument manufacturing facilities.

The phrase arises from 26 years' experience in combining the highest standards of precision in manufacturing with high-volume production.

In the facilities in Lynn, Mass., GE aircraft instruments result from applied research in the world's largest laboratory for measurement research and development. Specially designed machines are used by GE to assure accuracy within 20 millionths of an inch.

Hospital-like cleanliness in assembly areas assure precision products, many of whose parts are untouched by human hands. Continuous inspection and test is applied during every step of production, and a biography of each instrument is kept through each step of manufacture.

To assure instrument reliability at point of usage, careful wrapping and packaging is conducted under controlled conditions of humidity and dust-free air.

AIRWORK CORPORATION Millville, N. J.

A major aviation parts distributor in the East, Airwork has recently acquired the New York Air Brake line of Stratopower hydraulic pumps, motors, electric motor-driven pumps and spare parts, according to President Francis L. Hine. Warehouses at Newark and Miami have been expanded to handle new lines distributed through the Millville, Miami, Atlanta, Washington and Cleveland branches and those fixed-base operators who act as dealers.

An Operations Symposium on engines, accessories and navigation instrumentation will be held at Millville, Sept. 19 and 20.

AERODEX, INC. Miami, Fla.

Looking from a parts replacement area on the balcony toward one of the three final assembly-production lines, one gets this view of just one portion of the Aerodex facility. Over 264,000 square feet of floor space of this Miami base are devoted entirely to the overhaul of engines and accessories.



Raymond M. Tonks, president and general manager, reports aircraft engine output as being the largest in the world. Among its customers are domestic and foreign airlines, the armed forces and foreign governments.

ELECTRONIC COMMUNICATIONS, INC. (Air Associates) St. Petersburg, Fla.

From a small Fifth Avenue store in New York that performed such varied duties as selling tickets to the Graf Zeppelin and building hangars, Air Associates has grown in 30 years to a business with seven branch offices. From Fifth Avenue, AA moved to more expansive quarters at Roosevelt field, Long Island, where it went into manufacturing—including seat belts. After opening branches in Chicago, Glendale and Dallas, the Company built a new plant in 1940 at Teterboro (N.J.) airport. New branches followed in Miami, Atlanta and San Francisco.

By 1941 receivers and transmitters were



being produced at Teterboro as well as aircraft interphone sets. Recently the electronics division was relocated in St. Petersburg, Fla. Today, under the management of Fred A. Twomey, the company employs 167 persons headquartered in Glendale.

AEROQUIP CORPORATION Jackson, Mich.

Founded in 1940 by Peter F. Hurst and



a group of Jackson businessmen, Aeroquip was organized to engineer flexible hose assemblies, detachable, reusable fittings and Self-Sealing couplings for aircraft.

Following World War II, the company went into the industrial field developing hose lines and couplings for numerous fluids and aircraft uses. Today's sales are nearly double the 1952 mark of over \$20 million. The company employs over 2,000 people and has seven plants, including a subsidiary in Toronto, Can.

T.V. Weather at L.A. International

John Aldrich, a veteran of 25 years of forecasting, has become a TV celebrity. He is Chief of Aviation Forecasting at Los Angeles International Air-

port and recently debuted, along with others of his staff, in an experiment.

Weather briefings via TV are being piped by coaxial cable from the Weather Bureau to the United Air Lines office, and microwaved to the Air Force office, both at International Airport.

Whenever someone wants the latest weather gen, they just call Aldrich, then flip on their TV set and wait for the Great Profile to swing into action. This is an experiment that may go national one of these days.

Latest One-Man 'Copter

Manhattan Beach, Calif. E. Gluhareff Helicopter Corporation has announced the development of a 68 lb. one-man helicopter.

Flight tests have begun to test the single, asymmetrical rotor machine. The burner type jet engine, located at the rotor tip, uses LPG (propane) as fuel.

California Airport List Available

Sacramento, Calif. The California Aeronautics Commission, under Director Clyde P. Barnett, has published a list of well-traveled and remote Calif. airports which itemizes facilities for gasoline, food, rental cars and storage.

The list may be obtained by writing to the Commission office, Municipal Airport, Sacramento, Calif.

In the Business Hangar . . .

■ **PacAero**, Santa Monica, Calif. has completed the first 100-hr. inspection of Sangamo Electric Co.'s #1 Learstar Mark II. The firm has also placed its order for a second Mark II. U.S. Steel has had one of their Lodestars modified to include the Learstar Heating System; Learstar floor structure and floorboard system; short stack exhaust system with new, specially developed carburetor heat-muffs. U.S. Steel also operates 3 Learstar Mark I airplanes. Don Teel is chief pilot. □ Texas Eastern Transmission Corp.'s Lodestar has been brought in for an 8000-hr. overhaul, interior rework and conversion to a Learstar Mark II. Jim Ketner, Jr., is chief pilot. □ Warren Petroleum Corp.'s Learstar Mark II is in for installation of Bendix C Band Weather Radar and Dual Collins DF-201 ADF system. □ Capt. Bill Faulds brought the Harold S. Vanderbilt Learstar in for an annual inspection, installation of fillets and new-style electrical carburetor heat controls. □ Gillet's Learstar was in for minor modifications. H. E. Wood is chief pilot.

■ **Capitol Aviation, Inc.**, Springfield, Ill., has just completed a 100-hr. inspection of Kroehler Mfg. Co.'s Lodestar. □ Sangamo Electric's Lodestar was given a double engine-change, and the firm's Learstar has been put on a progressive inspection system by Capitol. □ A periodic inspection was recently completed on Central Illinois Public Service's Cessna 310, and on R. B. Potasnick's Lodestar.

SPARTAN AIRCRAFT COMPANY—Tulsa, Okla.

(Continued from page 39)



SINCE 1928, Spartan has served aviation as one of the oldest institutions of its kind. Its director of the aviation division, Capt. Maxwell W. Balfour, traces a colorful career in the air beginning when he piloted most of the planes produced for WW I. He has flown 45 different types of military planes alone.

The Spartan aircraft service division offers highly skilled personnel to give business aviation complete and round-the-clock service. Included are complete plane overhaul and remodeling; engine overhaul, radio and instrument repair and the redesigning or custom designing of instrument panels and plane interiors.

In the '30s, Spartan manufactured the Spartan Executive, a business plane recognized as the most advanced in its field at the time.

A branch of the Company's aviation division, the Spartan School of Aeronautics, offers technical training in aircraft engine mechanics, instrument instruction and repair and flight engineering. Spartan is the only recognized, privately-operated school which graduates CAA-approved flight engineers.

Photo shows where Spartan mechanics overhaul and reassemble engines.

Airways Antiquated?

(Continued from page 21)

foot-on-top clearance now as it is at the lower altitude. You can never tell who you are going to meet up there, separated quadrantly by 500 feet, with a rate of closure varying from 600-1200 miles per hour. It is surprising how that winking star you saw off on the horizon turned out to be a jet that just passed you, and probably flying on an altimeter setting 200 miles old. Yesterday it was a pleasure to make all voice contacts on UHF because there was an excellent possibility of contacting the agency on the first try. At times it was so quiet on the radio there was doubt in the mind as to whether the radio was really working. Today the nightmare of congested VHF frequencies is riding on the UHF band. Just try and get a position report into the radio range station you just passed over while clipping off 600 miles per hour; by the time contact has been made the actual position of the aircraft is 100 miles beyond.

The big question now is what to do about this situation; how do we correct it? How do we give the men who are controlling air traffic a break as well as the men who are required to use the various components of the system—the flivver pilot as well as the high-speed aircraft pilot? No doubt there are many answers to these questions but these answers cannot be filed away for future reference. The efficiency of an air traffic control system is dependent upon the devising of an adequate means of controlling high-density air traffic under instrument flight conditions. The Air Navigation Traffic Control Group of the Air Transport Association made several recommendations for the safe control of air traffic more than seven years ago. These recommendations considered that the following functions should be performed by an efficient air traffic control system:

1. The system should provide a method of navigation such that the pilot is at all times aware of his position and is able to follow well-defined mutually non-intersecting tracks.
2. The system should provide a method of rate control capable of timing and sequencing enroute traffic so as to insure time separation of aircraft to and on the runway.
3. In addition to the dynamic rate-control system, the system should include static safeguards and automatic control features such as to insure safety in the event of human error or malfunctioning of the rate-control system.

The biggest single factor that must be realized when considering these recommendations is the adaptability of the system to existing and programmed facilities so that all aircraft can operate under control of the responsible agency. The greatest increase in air traffic has been due to civil itinerant and military aircraft operations. To design or devise a system that will meet the needs of only one group of aircraft operators will in itself fail.

Flight along the civil airways is not as complex a problem as that existing within the terminal area, although it contributes to the overall situation. A smooth flow of traffic cannot be achieved unless it is possible for the ground facility to predict the number of aircraft that can be handled in a given interval of time. The situation calls for a greater improvement in the landing facilities if high traffic rates are to be handled. One of the most urgent requirements is a means for dealing with missed approaches. A missed approach has an effect on traffic flow which is far worse than merely the loss of one landing out of the sequence. Once the approach is missed the aircraft becomes unexpected additional traffic to be worked back into the landing sequence, or equally unplanned additional traffic to add to the departure load in the direction of the pilot's alternate. This missed approach situation will play an even more critical part in the operation of high speed, high altitude, high performance aircraft. Once this type of aircraft is cleared for an approach the landing must be made since the rate of fuel consumption at the lower altitude is far out of proportion to that realized at cruising altitude. Ground surveillance radar may be the solution to this problem in helping the pilot orientate himself prior to making the final approach. Even with this innovation it is necessary to afford the pilot a quick means of transitioning from instrument conditions to visual reference with the approach end of the runway. A standardized system of approach and threshold lighting must be devised; a system compatible to both military and civilian operators.

In addition to minimizing missed approaches and their adverse effects, it will also be necessary to provide for a smooth and efficient sequencing of approaches in normal operations. An efficient rate-control system must be initiated that can process the fastest and slowest aircraft so that they may be funneled into an approach sequence gate, one behind the other with no delay. To be fully efficient the system must be able to accommodate normal upsets in the routine; provisions must be made for handling moderate delays without seriously disrupting the normal flow of traffic. If voice instruction is employed as now, it must be on a frequency assignment wholly separated from that associated with normal traffic control. If airborne systems are to be employed their design must be standardized, simple in operation, and must be within reasonable cost for the average flyer that is expected to enter the high-density area. Most of all the system should be compatible to military and civil operations. The product VOLSCAN under test at the present time at Boston appears to meet the criteria established. The question is how long does a system like this have to be tested before it is put into operation?

Although the terminal traffic problem is of considerable size, what do we do about the enroute traffic that traverses the United States from East to West

and from North to South? It appears that this problem could be undertaken at the present time without the requirement for establishing the need for extensive electronic equipment. If we take Washington, D. C. area as an example we can readily see that it is necessary to establish numerous holding patterns to allow terminal traffic to hold while thru traffic proceeds before allowing the terminal traffic to descend. It would seem logical to develop by-pass airways away from the metropolitan areas that would allow through traffic to proceed without holding up terminal traffic. With the advent of such equipment as VOLSCAN and terminal surveillance radar, compatible to all aircraft, the problem of terminal delays should be reduced. This of course is not the final solution but at least it is a step in the right direction. With the advent of turbo-prop and jet airliners in addition to military jet aircraft moving from one location to another in a matter of a few hours or minutes, there is a need for a high-altitude air traffic control system. A system completely independent of the present structure but at the same time closely coordinated with it. It would not be necessary to have the same radio range stations receipt for enroute traffic as is done today. High-altitude air traffic could work directly with the centers; a separate function could be established within the centers that would handle only aircraft above a specific altitude, as determined by the Administrator of CAA. In conjunction with such a proposal there is the need for an efficient communications system for air to ground and ground to air contacts. Programmed for the future are such things as the Block Signal System, Aircraft Interrogator, Rate Control, and other electronic gear. Today, to reduce the amount of communications interference on the same frequency, it would seem logical to establish directional enroute frequencies. To be more explicit, if an aircraft is flying on a westbound flight the pilot would make all position reports to the enroute station on one particular frequency, if eastbound, on another. The same would hold true for north and southbound flights. This would reduce the number of repeats due to blocking of transmissions. This may require a study of frequency assignment and allocation but at least it is another step in the right direction. Lastly there is a need for a committee of active personnel, familiar with problems of aviation, whose sole responsibility is to stay abreast of the problems of air traffic as they occur. A committee which continually reviews the development of new facilities, judges the merit of recommendations that come in from the users of our extensive airways structure, and expedites the implementation of sound and reasonable suggestions.

This discussion has been an overview or a broad brush treatment of the air situation as it exists today. It represents the impression left on a pilot who is confronted with the task of making good his ETA, flying safely, and wondering whether he will finally end up at his destination or at his alternate.

It represents the feelings of a man who has attempted to remain courteous on the radio and let the next pilot get his report in before attempting himself. The word MAY DAY is a poor excuse for getting down on the ground at the expense of others when an efficient air traffic control system exists but is not backed up by adequate facilities. Recently the United States was requested to raise 101 billion dollars to improve our highways system, a system that has not kept pace with the vehicles utilizing it. The same problem exists in the air: the skyway that serves the flivver airplane as well as the cadillac aircraft is in sad need of resurfacing.

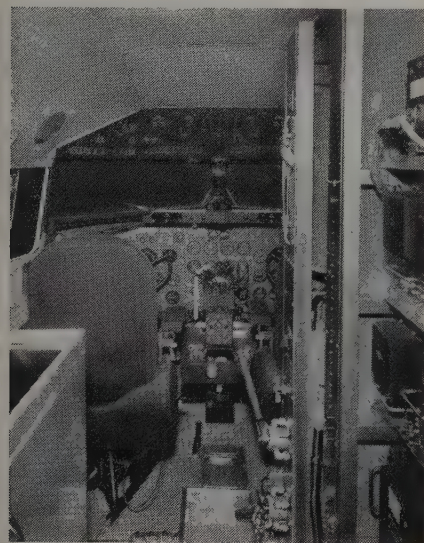
Heussler DC-3

(Continued from page 12)

this magnificent plane. There are 26 pages of specifications alone, without any adjectives. We'll take the high-lights, and hope you get a chance to see for yourself. Certainly, Don or Jack would be delighted to show you through personally.

One of the welcome features in any aircraft is a low noise level. The level in 175W is next to zero. This was achieved by carefully selected dual soundproofing insulation, thick floor carpeting and short stack exhausts.

The day we flew to Charleston, W. Va., was a typical IFR day in May. Murky clouds caressed the hills and a drizzle of rain brought out the raincoats and Jeppesen Manuals. Stepping up into the luxurious cabin, we hung our dripping coats in the cedar-lined closet, padded up to the wheelhouse and ensconced ourselves in the overstuffed C-46 chairs. This was our last really physical effort for the day. Taxiing out we caught an ATC controller in a moment of mental aberration, because our clearance came through, not only



COCKPIT shows thorough planning. Note snap-off soundproofing on emergency panel, spring-loaded checklist, radar panels on glare shield, Dual Jeppesen flight desk holders, direct reading fuel gauges, C-46 seats, AP-101D Autopilot.

at once, but exactly as it was requested. This was, of course, later modified, but it was fun while it lasted.

Just before starting our takeoff roll, Jack Prior released the throttle stops, permitting a 1350 hp takeoff. The DC-3 chewed up about 1200' of runway and lifted eagerly into the soup. We snapped on the AP-101 and, except for brief intervals of hand flying for demonstration purposes, never had it off again until we spotted the approach lights at Charleston.

Chuck Wolfe made coffee, the formula for which must have come from an old Cuban recipe—stronger than a blacksmith's apron.

Operationally, no detail seems to have been overlooked. On the left side of the instrument panel, the Collins Integrated Flight does its work smoothly and effortlessly. In case of failure, there is a complete vacuum system on the right side. It might be well to add here that your correspondent has had several years flying behind the Integrated Flight System with only one failure. All radio is contained in a rack behind the copilot seat, which is common in the DC-3, but the circuit breakers are smack dab out in the aisle where you can't help but fall over that popped-out button. Ship to shore radio is usually worth "fiddledee squat" under IFR conditions, so we didn't get to call anybody—but Don staunchly insists that it works.

Walking back into the cabin inspires a feeling of luxuriousness. In the center seats, two groups of people are conversing in normal tones, the muted cabin radio can be heard in any seat, and the huge windows give unbelievable visibility, although at the moment it was all you could do to make out the tips of the wings. The final, ultimate end, the pièce de resistance, is the picture window in the *biffy*. The lavatory of the average passenger plane sports one or two windows about the size of a stuffed kumquat, but 175W has a real honest injun double size picture window, out of which the view is breath-taking.

There are many other items of safety and convenience such as dual isopropyl tanks in the wing fillets, Fenwall fire detection system with two shot CO₂ system.

Congratulations are due to Don Heussler, Jack Prior and Chuck Wolfe, as well as the fine facilities and handiwork of Messrs. Remmert-Werner for turning out an extraordinary DC-3.

Research—Oils and Fuels

(Continued from page 30)

an obstacle to continuous production.

Experiments of several years on a "fluid" composed of catalyst and vapor had progressed to a point, however, where it justified rapid development to help save the situation. This fluid catalyst process had the advantage of providing continuous operation without mechanical conveyors or other moving parts. Its basic technique was the han-



ECONOMY PRICED — REAR MOUNTED SHAWNEE TRAILER BROOM for AIRPORT RUNWAY MAINTENANCE

- Quick Couplers and 3-Point Linkage permit easy mounting or removal.
- Broom is Hydraulically Driven.
- Angles Hydraulically — Tilts Manually.
- Swivel Stabilizer Wheel provides smoother sweeping.

This 7-ft. wide, 30-in. diameter broom attaches almost instantly. The Model TD-17 broom is available with finest India Palm bristles or steel core. Rear mounting provides maximum operator's vision. Recommended for all roadway and airport runway surfaces. ECONOMY PRICED.

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Division of Stearns Manufacturing Company, Inc.

What They're Saying . . . about SPEED CONTROL

"I made an ADF approach to a small airport during very low ceiling and visibility conditions at an angle of about 45 to the landing runway. When I broke out, I was very close in, due to a partial tailwind component, but Safe Flight's Speed Control had me all set up for the required maneuvering. Without Speed Control, I never would have tried it, but I was able to "rack" the DC-3 around tightly by keeping the pointer centered. I touched down right on the near end of the runway giving me plenty of stopping distance."

George F. Young
President
FAIRWAYS CORP.
Washington, D. C.

ENGINEERING

DEGREE IN

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dling of the powdered catalyst so that it was always in a fluidized condition and could be made to flow from one part of the unit to another like water.

Largely through the catalytic cracking operation and through finding the means to manufacture each component of 100-octane gasoline on a large scale—a result of the progressive extension of knowledge and development before and during the war by the American petroleum industry—it was possible by 1945 to multiply the daily production of 100-octane gasoline many times over. The pre-war peak production of 40,000 barrels a day of 100-octane aviation fuel was skyrocketed to the unbelievable war-time rate of more than 550,000 barrels a day.

Furthermore, before the war was over, American petroleum chemists had put an even better fuel than 100-octane into the front-line planes. Conventional means of measuring anti-knock value went by the board, since this new super fuel surpassed 100-octane. The Luftwaffe was pinned down to its own bases and Jap Zeroes were knocked down at the rate of four to one of our planes.

Since its beginning, aviation has had the benefit of both cooperative effort between oil industry, aviation manufacturers, and government agencies. Individual refiners work cooperatively with engine manufacturers. The API carries on cooperative work with the U.S. Bureau of Mines, keeping in close touch with airplane engine makers. For instance, recently the Bureau issued its National Survey of Aviation Fuels, 1956. This report on the properties of aviation gasolines and aviation jet fuels produced in the U.S. during 1956 was made under a cooperative agreement between the API and the Bureau.

The first jet engine development by the British used kerosene fuel—reported to have been selected because it was inexpensive and relatively safe to handle. During World War II when jet engine development work was initiated in this country, two separate lines of development were pursued with differing viewpoints on kerosene fuel, one held by the Army Air Force and one by the Navy.

At this time the Military Petroleum Advisory Board took a long look at the appetite of jet engines together with the availability of kerosene and AVGAS and made a strong recommendation for the development of a military jet fuel which would have greater wartime or emergency availability than either kerosene or AVGAS.

Today, in the Free World, the petroleum industry is called upon to furnish seven different types of jet fuels for the gas turbine engines in military and civil aircraft.

During and after World War II remarkable developments in refinery processes and the development of chemical additives might be said to have revolutionized aviation fuels and oils. These changes came by way of application to the stepped up high com-

pression automobile and still is very much the trend.

It is well to bear in mind that these developments are results of months and years of experimental and widespread field service testing by petroleum refiners to find optimum materials which they believe will result in a product which will serve their customers best.

Service and competition, in this outstandingly competitive industry, go together. As stated at the Flight Operations Round Table on Additives in Aero Fuels and Oils (see Skyways, August 1955), the many kinds of petroleum products and their characteristics, are decided upon by close and constant cooperation between the research and development laboratories of the petroleum refiners and the engine manufacturers. True, requirements are mainly defined by military specifications, but the fundamental goal is to improve aircraft-engine fuels and oil available to all and anticipating the needs of tomorrow.

Standard Oil Gets Viscount

Standard Oil Co. of Cal. took delivery of its executive Viscount. The aircraft is based at San Francisco International Airport.

Sinclair Establishes Aviation Technical Committee

Sinclair's Aviation Dept. has recently established a technical committee for the purpose of securing representative advice, consultation, and recommendation on matters affecting the safety, performance, modernization, and operation of the Sinclair fleet of airplanes.

Four members of the Av. Dept. comprise the committee: Allen F. Minich, Chairman; Kenneth F. Horton, Vice chairman; Ross J. Van Kempema and Thom. E. Giblin, members.

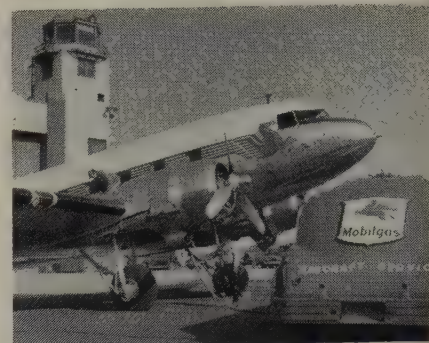
Their first problem is the proposed standardization of basic instruments for aircraft other than those in transport category.

Greater Miami Aviation Assn. Plans Ahead for Jet Aviation

Greater Miami Aviation Assn. recently discussed a proposal to construct an airport for jet aviation in Biscayne Bay, south of the city, to serve the area's needs for the next 25 years. The airport would be tied into a projected highway running from Miami Beach southward along a series of keys at the eastern edge of Biscayne Bay. Advantages would include take-offs and landings over water, thus eliminating safety hazards and noise nuisances, and would bar encroachment of housing developments in the airport vicinity.

If the proposed jet airport is constructed, present facilities, which are rapidly reaching the saturation point could continue to be used by reciprocating-engined and turbo-prop-powered aircraft for short runs and cargo operation.

Here are a few suppliers for business aircraft



SOCONY Mobil services its corporate plane.



PAC's truck services planes with "76" gas.



SOUTHERN OHIO uses Shell products.

East-West Airway Opened Via Pueblo, Colorado

Victor 210 from Los Angeles to Pueblo, Colo. via the Grand Canyon is now available.

It is based on VHF radio ranges located at Los Angeles and Daggett, Cal.; Valle, Ariz.; and Farmington, N. M.; it terminates at Pueblo, Colo. At Pueblo, Victor 210 hooks on to Victor 10 running between Pueblo and New York. It is all a part of trans-continental Airway Victor 1512 running from Los Angeles to New York.

Safety Exchange

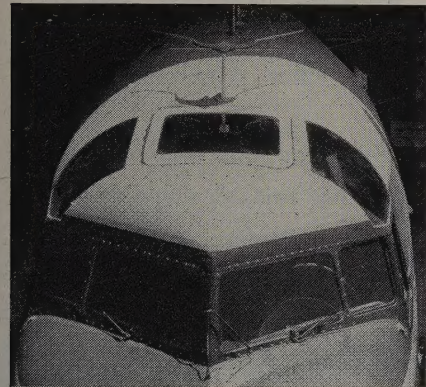
(Continued from page 52)

On this theory Atkins arranged his streamlined multi-light fixture so that within zero to 60° either side of the nose, the on-coming pilot sees a hi-intensity condenser discharge blue-white flash blinking at him at the rate of 3 flashes per second. The sense of urgency is immediate and great, violent evasive action may be necessary.

Within the side approaches, from 60° to 120° either side, the light flashes once a second, commanding immediate attention but allowing some reasonable time for interpretation (diverging, parallel, passing or converging) and reaction. In the tail quadrant, 120° to 180° either side, the light flashes once every 3 seconds demanding attention and enabling easy tracking in event of course-change or over-taking.

Obviously the above are not the only answer to the night problem (they are also valuable in daytime lo-visibility) — they are the best so far. Still needed in hi-density terminal areas is a means of selective identification at night as well. Numerous dangerous situations are caused by aircraft in airport patterns picking up and following the wrong aircraft in a landing or approach sequence, subsequently conflicting with the assigned preceding aircraft.

We must mention another approach. We suggest airframe manufacturers examine the glass cage cockpit of the Garrett Corporation's DC-3.



THIS VIEW shows the new roof-window installation on The Garrett Corporation's DC-3, from above. The unique installation was done by the corporation's AiResearch Aviation Service division, one of the country's largest service and modification centers for business aircraft.

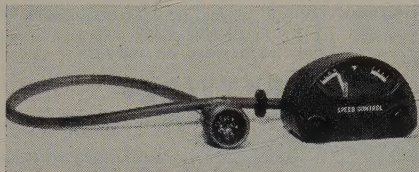
Lift Indicating Devices

Along the same principle as the foregoing, i.e., relieving the pilot of the status of a human computing device and freeing him for decisions of an operational nature, are the lift sensing devices. "Feel" of an aircraft in a sensitive attitude or during critical points of an approach or climb-out, is finally and justly on the way out. Because there are so many more important areas of responsibility for a pilot than just the perfect mechanical control of his machine, Dr. Leonard Greene's Stall

Warning Indicator (Safe Flight Instrument Co., White Plains, N.Y.) was a significant advance.

Not just for the novice or weekend pilot, the Indicator has found acceptance in military as well as civilian circles. No human pilot can detect as accurately the exact proximity of a stall at any given speed, attitude or weight as the Indicator. This is just as true as that no human can without visual reference by the "seat of the pants."

Even under routine operating conditions, the most efficient speed for all conditions of climb-out or landing is just good operating sense and, in fact the most economical. This applies also to runway usage in hi-density terminals. Hence, the later development of Safe Flight, the Landing Speed Indicator is



a must. During non-routine conditions, as gusty air, propwash or wingtip vortices on final or takeoff, or during mechanical difficulties, maximum efficiency is necessary for recovery from a dangerous situation. Agricultural aircraft, or news photo flying must operate on the ragged edge at low altitude. This is at best a gamble. The LSI is the first instrument to weigh the odds somewhat in the pilot's favor.

The LSI is unaffected by lack of adequate rest the night before, tiring long IFR flying in rough weather, bad stomach from the last meal stop or by an argument with the little woman! Can you say the same?

The same company offers Auto-Power, a means of automatically adjusting the throttles on the approach to maintain any desired margin above stall speed—based on the same sensing devices used by the SFI and LSI. Supplementing auto-ILS, the pilot can be entirely freed to "monitor" the approach in all aspects, position on localizer and glide slope, critical altitude, range, air speed and especially early and prompt transition to visual contact.

Not forgetting the differences of opinion as to auto-feathering, we wonder if any research is being conducted to develop auto-control of engine-out emergencies? Is it credible to anticipate a device, combination of autopilot, LSI and Auto-Power that would react faster than the human pilot to roll in the necessary trim, adjust altitude to attain and/or maintain a safe engine-out control speed, adjust powerplant and propeller controls for maximum efficiency, etc? What do you think?

Crash Survival Equipment

There is an apparent reluctance of the flying fraternity to display more than a passing interest in shoulder harness, even for use only during takeoff,

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landing or anticipated turbulence. Sufficient statistical data has been accumulated from actual crash reports and crash injury research such as the excellent Cornell University Crash Injury Research, to sustain the clear fact that many serious and fatal injuries in crashes of all magnitudes could have been eliminated by the use of shoulder harness.

Howard Hasbrook, noted Director of the research organization, points out that certain misconceptions exist about the harness and its use. It appears the principal objection, that of restraint to necessary cockpit movements, applies to fixed harness but not to harness and reel combinations that permit a reasonable rate of body movement while preventing high-G accelerations.

And there are several types of inertia or impact-locking reels. Those that restrain only against straightforward pull obviously would be of little value in the not uncommon circumstance of an aircraft crash path that was at an angle to the fore-aft axis of the airplane, as in a sidewise slide, rolling or yawing action.

To overcome this, some reels are actuated by decelerating forces in excess of 2½ G's of the aircraft structure in any direction. Another locks on disruption of the aircraft's primary electric power, etc. Some permit normal body movement up to 18°, others up to 30°.

It was found that harnesses that do not provide crotch restraint defeat the purpose of the entire system (no significance is taken here as to the minor percentage of professional women pilots. It is thought that an adaptation could be arrived at.).

Complete safety harness is available,

(Continued on page 80)

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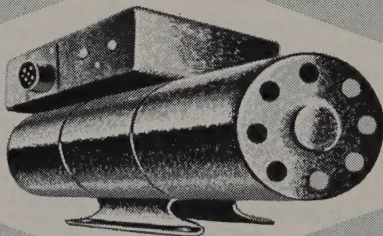
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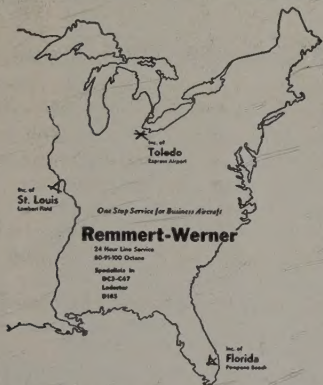
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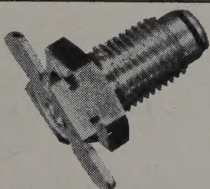
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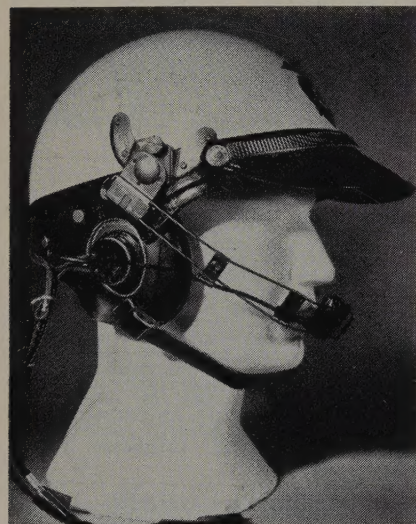
Safety Exchange

(Continued from page 75)

practical and reasonably comfortable for the short period of time that they should be worn in conventional civil operations. Lap belt portions or their current types are and could remain adequate for 90% of time in flight.

Going further into the rewards of crash injury research, Hasbrook reveals that similar benefits accrue from the use of protective head gear under almost exactly similar circumstances. The obvious physical and psychological objections to wearing the typical jet pilot's 'man from Mars' configuration are substantially met by the latest available designs. They most closely resemble the very sporty, and not at all unattractive, polo player's helmet.

The familiar peak or sun visor of the "50-mission" or airline captain crushed hat with appropriate ornamentation makes the whole quite flattering. Attachment of radio mike and/or earphones is not mandatory where hand-mike and cockpit speaker use is preferred. If the crew would be embarrassed by enroute use of protection not supplied to their VIP passengers, the hats can be readily hung up on the



cockpit rear partition or make some operational excuse to shut the access door!

These and other up-and-coming safety accessories are to be obtained thru such firms as Gentex Mills, Pacific Scientific Air Products, Air Associates and Toptex, Inc. Your comments are invited.

Survivability after a crash is at least as important as surviving the crash. If over-water flight is extensive as in the Caribbean area, or even in undeveloped country where ditching in a lake is preferable to the trees or rocky mountain slope, flotation gear of special nature or as dual use equipment part of cabin furnishings is obviously desirable. Specialized gear is available from Pan Avion of Miami, etc.

First aid kits are a part of every business aircraft equipment. But better than that, the Victor Tool Co., Oley, Pa., offers a Global Survival Kit that

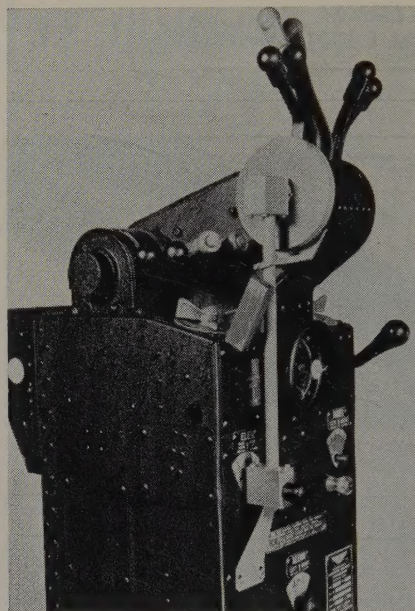
contains food, medicines, signals, axe, poncho, fishing gear, etc., for "pilot only," in a compact case 18" x 6½" x 4", weighing 12 lbs. (If your passengers don't bring their own, they might at least supply a deck of cards.) Sufficient kits for the crew would be at least a starting point for reasonable hope of survival of an average business plane load.

There are many items we haven't mentioned, for lack of space and time, such as:—

—Plastic, transparent hoods for IFR practice, if you must practice in busy areas.

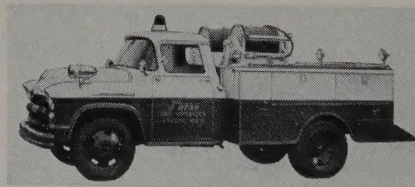
—Contamination detection cards for spray pilots working with dangerous poisons, by the American Cyanamid Company.

—Trim control modification for Lode-



stars, to cure that "head down and locked" disease when rolling out excess pitch in many maneuvers; by Aircraftsmen, Inc. of Amityville, N.Y.

—Small field fire and crash emergency apparatus by John Bean, Inc. and many



other excellent companies.

—In-flight engine analyzers to detect deficiencies before failure occurs, by Sperry, Bendix, Land-Aire's new In-flight 136 and others.

These instruments pinpoint most engine malfunctions long before it is apparent to the most experienced flight crew member. The extra safety value in detecting conditions that often lead to disastrous engine failure is frequently overshadowed by the maintenance advantages in early detection, correction and/or shut-down of an incipient failure. Although Sperry, who pioneered in the field, designed primarily for the larger multi-engine aircraft, the growth

of business flying should see the spread of this device to all sizes of aircraft flown for business.

—Reflective paint and color schemes for high conspicuity in daylight, by Day-Glo Paint Co., as exemplified in Sprague Electric's beautiful Twin-Bonanza.

—Windshield Rain Repellants long on the market are now added to by anti-fogging and de-icing compounds. The Sierracin Corp., Burbank, markets an electrically conductive transparent coating for inside windscreens or cockpit canopies. May be applied to glass or polyester plastics and transmits 60-70% of light and reflects solar heat rays.

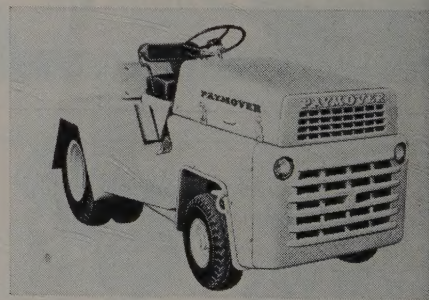
—Film type heating elements may be designed to required heating values and sprayed on flat or contoured surfaces—by ElectroFilm, Inc., Hollywood. This may yet be the answer to inflight de-icing of windshields and other surfaces of lighter aircraft where boots and/or current thermal de-icing techniques are not practicable.

—There are many more of both greater and lesser significance than those mentioned here. Best example possibly would be Aerojet Co.'s rocket assist units, such as installed on the Falstaff Brewing Co. DC-3. They are capable of giving that all-important "bootstrap" lift in the event of an engine-out take-off or other emergency situation, to add a happy ending to an otherwise possible tragedy.

AEROJET-GENERAL CORP., Azusa, Cal.

Within a few months, light-twin and single-engine business aircraft may be equipped with Aerojet's standby rocket engine. Part of a program initiated by President Dan A. Kimball, the company's 15NS-250, junior version of their 15KS-100 JATO, is undergoing tests toward issuance of a CAA engine type certificate. This new smaller unit weighs only 42 pounds, produces 250 pounds of thrust (100 horsepower) for 15 seconds.

Standby rocket engines are being developed for every type of business aircraft with 11 different types already equipped. Distributors and certificated repair and modification centers in the U. S. and Canada have made the installations.



FRANK G. HOUGH Co. announces introduction of Paymover towing tractors for the ground handling of business and commercial planes. T-50 pulls 5000 lb.; T-60 pulls 6000 lb. Four-wheel-drive and 4-wheel-steer models in near future. Compact Paymovers have torque converters, automatic transmission.